MASSACHUSETTS

SOLID WASTE MASTER PLAN

1994 UPDATE

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Department of
Environmental Protection

EXECUTIVE OFFICE of
ENVIRONMENTAL AFFAIRS

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
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Dear Citizen,

We present this document, the 1994 Update to the Commonwealth's Solid Waste Master Plan, with pride in the accomplishments it chronicles and excitement for the new initiatives it promotes. We also release it with great appreciation for the time and effort you put into making local recycling efforts successful, such as the City of Worcester's impressive 40% waste diversion rate, and helping us craft a state vision for meeting our common goals.

As you will see in reviewing the document, great strides have been made toward building a system of integrated solid waste management since issuance of the 1990 Master Plan; the Commonwealth exceeded its waste diversion goal for 1992 and today recycles and composts at least 28 percent of its municipal solid waste. Credit for this goes to the millions of Massachusetts residents who believe in the waste management hierarchy that puts source reduction first, waste diversion next, and disposal as the last resort. These citizens, in their homes and offices, have made the recycling industry thrive. Today, this industry's value to the Commonwealth's economy exceeds $600 million and represents more than 10,000 jobs.

The Master Plan Update looks into the future at the Commonwealth's strategy to meet the goal of 46 percent waste diversion by the year 2000 and reduce the toxicity of the wastestream. We believe the strength of the partnership among individuals, organizations, business and the public sector reflected in this Update will continue Massachusetts' leadership in the integration of environmental protection and economic development

Sincerely,

Trudy Coxe
Secretary
Executive Office of Environmental Affairs

Thomas B. Powers
Acting Commissioner
Department of Environmental Protection

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EXECUTIVE SUMMARY

This 1994 Solid Waste Master Plan Update documents the Commonwealth's progress toward developing an "Integrated Solid Waste Management System," whereby recycling and composting facilities are integrated into the existing structure of solid waste landfills and combustion facilities. It focuses on areas of solid waste management in which the Commonwealth has made significant advancements and where activities have shifted since release of the original Master Plan in 1990. The Update reaffirms the waste management hierarchy (reduction, recycling, combustion with energy recovery, and landfilling), the waste diversion goals, and the restraint on new disposal facility development as one means to attain those ends. It also unveils new approaches and chronicles how resources will be dedicated in order to realize the Commonwealth's goals for municipal solid waste management to the year 2000.

The Update reflects many of the balanced and insightful comments received from a broad spectrum of interested citizens, businesses and organizations. A separate Response to Comments document has been prepared and will be sent to all those who submitted written comments.

PURPOSE OF THE MASTER PLAN

This Master Plan Update has four main objectives: (1) provide an update to the 1990 Integrated Solid Waste Management Master Plan; (2) propose a ten-point Recycling Plan to be funded through unredeemed bottle deposits collected in the Clean Environment Fund; (3) discuss the procedure the Department of Environmental Protection (DEP) has adopted to permit projects to fill the need for additional solid waste disposal capacity; and (4) advocate for unit-based solid waste user fees as a tool for reducing the generation of solid waste.

THE 1990 SOLID WASTE MASTER PLAN

In 1990, the DEP issued the agency's first Integrated Solid Waste Master Plan, which set forth a series of waste diversion and source reduction goals for the Commonwealth over the next decade. By 1992, 23 percent of all solid waste generated in the State was to be either recycled or composted and, thus, "diverted" from disposal facilities. By 1994, the goal was increased to 34 percent and, by the year 2000, that goal was set at 46 percent. In 1990, 6.75 million tons of municipal solid waste (MSW) were generated in Massachusetts. It was projected at that time that, if residents and businesses did not reduce the amount of solid waste they generated, total MSW generation would increase 3 percent by 1992, 6 percent by 1996, and 10 percent by 2000.

REALIZING THE 1990 SOLID WASTE MASTER PLAN GOALS

The 1994 Solid Waste Master Plan Update revisits these and other solid waste management goals set forth in the original Master Plan. DEP reports that the 1992 waste diversion reached 28 percent and the source reduction goal of 3 percent was met. Today, Massachusetts residents, businesses, and institutions generate less MSW than they did in 1990, totaling approximately 6.4 million tons per year .

Recycling and Composting.

Recycling and composting show similar positive trends. In 1990, only 190 recycling programs were in place. By the end of 1992, almost every community had some type of recycling program, ranging from numerous drop-off centers operated by local volunteers to community-wide curbside recycling collection programs. Similarly, nearly every Massachusetts community now offers a leaf

and yard waste composting program. One key to the increase in recycling has been the expansion of the Springfield Materials Recycling Facility, a State owned, privately operated facility located in Springfield that provides recycling processing services to 99 Massachusetts communities.

Creating a demand for recyclable materials is beginning to receive special attention because of its role in improving the overall economics of recycling. While the Commonwealth purchased only about $2.3 million worth of recycled products in fiscal year 1992, the DEP is expanding its past work with state procurement officials to increase the purchase of recycled products as part of the Commonwealth's Clean State Initiative. DEP has also assisted state agencies in understanding the economic development potential of recycling facilities. Recycling related activities represent some 10,000 jobs and contribute $600 million annually to the Massachusetts economy.

Several initiatives to encourage voluntary efforts by the private sector have been promoted by the Administration, which have moved businesses to recognize the cost savings in using recycled materials. The Governor's "Massachusetts Packaging Challenge", for which 33 companies were recognized for their use of post-consumer recycled materials in their packaging, DEP's agreement with the Yellow Page Publishers Association, and similar voluntary corporate initiatives, developed with State assistance have all helped build the recycling infrastructure. Voluntary efforts will continue to be encouraged and tracked to assure that sufficient progress is being made through this voluntary approach.

Landfills and Combustion Facilities

The 1990 Master Plan set a goal for the use of combustion facilities to increase to no more than 50 percent between 1990 and the year 2000, and for the use of landfills to diminish from 42 percent to 4 percent over that same time frame. Today, incineration capacity is nearly at that level. Increased waste diversion through recycling and composting, coupled with a decrease in waste generation, have resulted in most of the state's commercial landfills operating far below permitted capacity despite a net import of approximately 400,000 tons of solid waste.

The closure of unlined local landfills, moreover, has not proceeded according to the original Master Plan, with about 19 percent of MSW still being landfilled today. Due to the health and environmental risks posed by these landfills, the DEP has begun to close those that pose the greatest threat. Legislation enacted last year replaced a mandatory closure date for unlined landfills with a site assignment and negotiation process. The DEP has published a list classifying unlined municipal landfills based on the degree of risk that they pose, and is now commencing negotiations with municipalities operating landfills classified as a significant threat to secure the prompt closure and capping of these sites. DEP also intends to ensure that the other unlined landfills are in full compliance with the statutory timelines to install ground water monitoring wells and applicable operating requirements established under the solid waste regulations.

BUILDING MOMENTUM TOWARD THE YEAR 2000

While there have been many achievements over the past three years related to recycling and composting, doubling waste diversion and tripling source reduction over the next six years will require the continued efforts of government, residents, environmental groups, and the business community. A key element of the Administration's strategy to meet these challenges is a plan for expanding recycling that aims at overcoming some of the barriers to recycling perceived by those most involved in the field.

The funding source for this Recycling Plan is the Clean Environment Fund, which was created by the Massachusetts Legislature in 1989 to receive the unredeemed bottle deposits resulting from implementation of the Bottle Bill. The revenue available from the Fund for this Recycling Plan is anticipated to be about $16 million annually. In fiscal year 1995 $5 million was appropriated for

the recycling related expenditures discussed in the Update.

The Recycling Plan was developed by DEP and the Executive Office of Environmental Affairs (EOEA), along with representatives of municipalities, industries, service providers, environmentalists, and others with expertise in recycling. The following ten-point Recycling Plan was developed to overcome recycling barriers identified by the group:

Municipal Recycling and Composting Equipment Grants: Over the last four years, DEP has funded over $7 million in recycling and composting equipment for municipalities. This support has greatly contributed to the growth of residential recycling during this period. DEP will continue to offer these grants for the next two years. For the first time the grant will include the cost of trailers to be located at transfer stations to move recyclables to processing facilities.

Public Recycling Education Campaign: This Campaign is designed to respond to a number of needs for recycling education within the Commonwealth. In the first year funds will continue to be directed toward community programs for residential recycling and composting. This will include grants for educational materials and may be extended to include support for community based educational coordinators In later years more resources will be directed to improving the information base businesses would have available in making decision on whether to incorporate recycled materials into their products and packaging.

Household Hazardous Waste Program: The Administration's recycling goals are focused not only on reducing the amount of waste disposed but also the toxicity of the waste. Recycling alternatives presently exist for several household hazardous products, including waste oil, anti-freeze and paint, but access to these markets is not readily available to Massachusetts's residents. Funds will be granted to municipalities in the first year to establish used paint sheds and used oil collection tanks so these materials can be more efficiently collected and marketed. Additional legislative and policy work will also be conducted to develop mechanisms to rid the wastestream of batteries containing heavy metals. In subsequent years DEP intends to develop and fund methods by which the public can get timely answers on how to manage a wide range of hazardous products and also consider promotion of regional collection centers for other toxic substances.

Public Recycled Procurement Campaign: To strengthen the demand for recyclable material, funds will be used to increase state government purchases of recycled products. Dedicated resources would be located in the state purchasing agency to research recycled products and educate buyers and users of recycled products. Recycled purchasing will be directed not only at paper products but also at materials used in the construction and transportation sectors.

Municipal Recycling Transfer Stations: To address the high costs of transporting recyclables and solid waste, municipal grants will be made available for the construction of a number of regional facilities that could help consolidate solid waste for transfer to composting, recycling and disposal facilities.

Guaranteed Annual Tonnage Contract Assistance: Under this proposal, support will be provided to communities, with higher than average solid waste costs, that are compelled to pay a disposal fee for waste that is recycled or composted because they have contracted with a combustion facility guaranteeing that all or most of their waste will be sent to the combustion facility.

Recycling Research and Development: Working cooperatively with industry, economic development agencies, and universities, the fund will be used to develop pilot projects through the University of Massachusetts to conduct research on reducing the barriers to increased plastic recycling.

Higher Education Fund: This initiative will initially fund studies on source reduction and recycling issues. If sufficient interest develops, the

program may be expanded to fund recycling curricula.

Investment Loan Fund: This initiative will stimulate the development and expansion of recycling and composting industries in the Commonwealth by funding the development of technical assistance resources on recycling at the state's economic development agency and also providing credit enhancement to increase companies' access to the capital markets.

Springfield Materials Recycling Facility (SMRF) and Cooperative Marketing Fund: In recognition of the role the SMRF plays in reaching our waste diversion goals, funds will be used either to support recycling processing costs and expanded access at the facility or to purchase the recycling equipment in the state-owned building. The SMRF would also offer a Cooperative Marketing mechanism that would operate as a "safety net" to insulate the prices paid by recycling programs to move materials to market from commodity price collapse, helping to stabilize markets. The sale of collected recyclables at a base price would be guaranteed, allowing municipalities and the vendors who service them to better plan for reasonable "worst case" scenarios over longer term contracts, without disrupting the flow of commodities during normal markets.

OTHER TOPICS COVERED IN THE MASTER PLAN

The Update also includes an expanded discussion on topics which have been the focus of considerable public interest or have undergone substantial development since the release of the original Plan. The methodology by which DEP reviews the need for new solid waste disposal capacity consistently sparks both policy and technical debates during the Massachusetts Environmental Policy Act (MEPA) process and the DEP permit review.

The document outlines the capacity needs methodology and describes the process DEP will use to make disposal capacity determinations in the future. The regional need analysis will no longer be applied as a limitation on the expansion of disposal capacity. Instead, regional need will be examined in the context of special consideration to be given to single municipality projects. To accomplish this latter objective, DEP is proposing to amend its solid waste regulations to lower the tonnage threshold for triggering a review of whether additional disposal capacity is needed. The agency has also concluded after an extensive technical review that combustion facility operations have not been significantly affected by waste composition changes, and therefore these facilities will be assumed to be able to continue to operate at their current design capacities.

The draft Update proposed an "RFP" process to select among disposal projects on a competitive basis as a substitute for the current process which allocates capacity on basis of the order in which projects receive their permit approval. Based on public comments received and questions on how a revised procedure would apply to the numerous projects already in the environmental review pipeline, DEP has determined to defer implementation of the RFP process.

In addition to refining the methodology, the Update sets out the Commonwealth's projections for MSW disposal capacity need in the milestone years 1996 and 2000. Excess landfill capacity will continue through 1996, but the possibility of a moderate shortfall in capacity is predicted for the year 2000. Recognizing that the shortfall is dependent upon several assumption that are subject to change in the next few years, the report discusses the waste acceptance limitation DEP will impose in permitting pending landfill expansion projects.

Major legislative and regulatory changes in the closure of unlined landfills occurred in 1992 and 1993. The Update reviews those changes and provides a characterization of the threat posed by unlined municipal landfills based on the assessments conducted over the last year.

Making recycling a permanent part of the solid waste system will require strong stable markets for the material diverted from disposal. While the need for recycling markets was acknowledged in the

1990 Master Plan. this Update begins the process of quantifying the scope of the current recycling infrastructure in Massachusetts and its contribution to our economy. Using the rapid growth of the recycled content of newspaper in the last three years as a case study. the Update outlines the need for a mix of regulations, financial incentives, technical assistance. coordination. and commitment among government agencies, as well as voluntary actions by waste generators and product manufacturers, to stimulate demand and meet the needs of end user markets.

While recycling is often in the limelight, composting has made strong gains in the past several years and will be a major factor in meeting the state's overall waste diversion goal. Starting with leaf composting. the Update documents the expansion of composting into a wide range of organic materials at a variety of residential. commercial, and agricultural locations.

Fundamental changes in the management of solid waste by municipal government demand a thorough re-examination of the means by which communities finance their collection. waste diversion. and disposal responsibilities. The Update examines the advantages of user fees as an effective alternative to tax-based solid waste financing systems. "Variable rate" user fees. in which residents pay for the amount of waste they generate. have proven effective at reducing waste generation by changing an individual's purchasing habits. in addition to increasing recycling rates. DEP will work with communities to provide the technical assistance necessary to implement these important programs

The Update also summarizes the status of waste stream components that are often managed differently than the typical residential and commercial wastestream. These "difficult-to-manage" wastes continue to present special demands on the system. and are often not being managed in the most efficient or environmentally sound manner. DEP will commence an analysis of the construction and demolition waste stream in anticipation of setting source reduction and recycling goals for this component. The Update particularly focuses on plans to develop a broad strategy to reduce and recycle hazardous household products. One important aspect of this strategy will be to work to enact legislation that requires the reduction or recycling of batteries containing mercury and cadmium.

This document is not intended to detail the entire scope of commendable public and private activities that have occurred since the publication of the 1990 Master Plan. However. these activities have put Massachusetts in the enviable position of having both sufficient solid waste disposal capacity and a rapidly expanding recycling and composting infrastructure. It is DEP's intent that the information provided in the Update will be useful to all citizens. businesses, and public officials interested in the future of solid waste management in the Commonwealth.

FORMAT OF THE UPDATE

The Update is contained in two volumes. Volume One contains the Plan. Volume Two contains additional technical information related to the disposal capacity needs methodology as well as the solid waste management system data and analysis supporting the graphs, tables and disposal capacity projections presented in Volume One.

INTRODUCTION:

MEETING THE CHALLENGE

Four years ago the Commonwealth's Solid Waste Master Plan, "Toward A System of Integrated Solid Waste Management" profiled our State's waste management system. It portrayed a pattern of increasing waste generation and dependency on disposal. It proposed a set of strategies to change that direction predicated on building an integrated solid waste management system led by source reduction and recycling.

The way Massachusetts residents take out their trash has changed dramatically in the four intervening years. Today, nearly every community offers residents some form of recycling and composting services. The Springfield Materials Recycling Facility now serves 99 Massachusetts communities, and plans are well underway to continue this service. When opened in 1990, this facility was the first of its kind in Massachusetts and was the nation's largest recycling facility. Since then three other MRF's accepting commingled material have come on line, all owned and operated privately.

The volume of waste diverted through recycling and composting documented in this report has occurred despite major obstacles, making its achievement even more remarkable. Waste diversion has expanded in the face of shrinking municipal budgets, declining disposal prices and economic recession. Without mandatory statewide recycling legislation or the benefit of large state subsidies, citizens and public officials created programs to generate a steady supply of recyclable and compostable material. Established waste haulers and facility operators as well as entrepreneurs have responded to the increasing quantity and quality of recyclables by providing services and making investments to collect, process and remanufacture what once was trash into industrial feedstocks and consumer products.

Municipalities which contracted for solid waste management services in the last few years have benefited from both the drop in disposal prices and fees for delivery of recyclables. Still, solid waste management remains one of the largest municipal budget items. Increasingly, Massachusetts cities and towns are turning to user fees as a mechanism to control and allocate solid waste disposal and recycling costs and also, in the case of unit based systems, to encourage residents to increase recycling and reduce the amount of trash they throw away.

This Update of the Solid Waste Master Plan documents change--the progress that has been made toward developing an integrated solid waste management system and the new initiatives taken by state government. It recounts the actions taken by the public and private sectors, which together have created a tremendous momentum to transform the way residents and businesses handle their refuse. In doing so, the Update reaffirms the key integrated solid waste management goals set out in the 1990 Plan. The Update also recognizes that a pro-active approach is still required to make source reduction, recycling and composting a permanent aspect of our environmental outlook and economic infrastructure. This report chronicles how the Weld/Cellucci Administration is dedicating resources to increasing waste diversion toward the Commonwealth's goal of 46 percent recycling by the year 2000.

As one means to effectively respond to these changes the Administration places a priority on providing information to stimulate market decisions and local activity. A key objective of this report is to present facts, figures and analysis that document the advances made since the 1990 Plan and provide projections essential for statewide and regional planning. By example, data on waste generation, diversion rates and landfill closure schedules is crucial to DEP permit and private investment decisions affecting the types of facilities developed to properly manage the State's waste.

Information is also a critical factor in other kinds of decision making crucial to achieving an integrated system. Certain voluntary activities, such as the Governor's Packaging Challenge, rewards efforts by Massachusetts to use recycled materials in the products and packaging they sell in Massachusetts. DEP's sponsorship of the business to business recycling technical assistance program "WasteCap", and its creation of a network of "Master Composter" trainers further demonstrate the agency's recognition of the multiplier effects from having successful participants become the information source to their peers.

Using information to improve municipal solid waste management. Governor Weld signed legislation last July creating a public process through which DEP and municipal officials exchanged and reviewed technical data that yielded rapid but detailed assessments of the site specific threat to public health and the environment posed by each of the nearly 100 unlined municipal landfills. The information on the adverse impact of many of these sites has already led to a number of early closings and will provide the basis for negotiations between DEP and communities to close operations posing a threat and bring the remainder into full compliance with solid waste regulations

The streamlining of the regulatory process has also proved to be an indispensable incentive in the expansion of traditional and innovative recycling technologies. Businesses in diverse fields from recyclables processing operations, paper deinking, plastic pelletizing and fabricating, industrial sludge recycling and yard waste and agricultural composting have all benefited from a streamlined review and approval process. This represents just one example of the Administration's effort to streamline permitting and promote innovation throughout state government.

Another innovation is the Commonwealth's strategy to motivate recycling activity by placing greater focus on market demand rather than supply. While recognizing the importance of programs that support a consistent supply of recyclable material, the Update details the new initiatives offered to expand the "recycling infrastructure." The Administration's plan includes ten strategies that aim to increase recycling by addressing a range of recycling barriers including market uncertainty, high transportation costs, recycled product procurement constraints and difficulty in securing capital to finance new or expanded production and research and development. Many of these new efforts are dependent on the Commonwealth creating successful partnerships with businesses, academic institutions, and the environmental community, as well as on the development of strong cooperative relationships among various state agencies, including those involved with economic development and the procurement of state goods and services.

A dedicated resource to implement this agenda is the Clean Environment Fund (CEF). The unclaimed bottle bill deposits which make up this Fund dedicated by statute to promote recycling and solid waste management purposes. Approximately three million dollars in new CEF spending has been approved for the 1995 fiscal year.

This 1994 Solid Waste Master Plan Update is composed of two volumes. The first volume begins with an assessment in Chapter One of the Commonwealth's efforts to meeting the objectives set out in the original Plan. Chapter Two outlines the new agenda: the ten-point recycling plan and other measures that the Administration will implement to meet the recycling and source reduction goals in the years 1996 and 2000. Chapter Three provides a comprehensive profile of the State's integrated solid waste management system for the milestone year 1992. Chapter Four details the process used by DEP to determine the need for additional disposal capacity. It responds to questions and concerns raised by citizens and project proponents on the assumptions and methods DEP relies on when making capacity needs decisions.

DEP's recent work to provide technical guidance and information to municipal officials on the site specific risk posed by their landfill is presented in Chapter Five. Nearly one quarter of these operations present a direct threat to drinking water supplies and are targeted for accelerated closure.

Following this is a discussion, in Chapter Six, about the development of recycling markets and the DEP's programs to increase both the supply and demand for recycled materials. Using the newspaper industry as a model, the chapter demonstrates the mix of strategies that changed business practices and promoted major capital investment in using recycled feedstock. Composting programs, which have fast become a major contributor toward meeting waste diversion goals, are outlined in Chapter Seven. In addition to describing the program to date, the chapter establishes a hierarchy of approaches in converting organic waste to beneficial soil products. Chapter Eight presents solid waste user fees as one of the Administration's main strategies for increasing recycling, reducing residential waste generation and controlling solid waste management costs. Finally, Chapter Nine outlines four of the "difficult-to-manage" wastes that DEP has targeted for special attention -- construction and demolition debris, tires, biosolids, and hazardous household products. The chapter acknowledges that additional planning and assistance must be provided to make comparable progress in reduction and diversion progress for these items.

Volume Two is devoted to further discussion of the capacity needs methodology presented in Chapter Four. It also contains spreadsheets detailing the municipal and disposal facility specific data that is summarized in Volume One and forms the basis for determination of future need for disposal capacity.

CHAPTER ONE

REALIZING THE 1990 MASTER PLAN GOALS

At the time the 1990 Solid Waste Master Plan was being written, per capita municipal solid waste generation was expected to increase, recycling programs were available in only about half the municipalities around the State, and revenues from commonly collected recyclables were on the decline. In the midst of these events, the State set a new direction and created an agenda for change. The new direction was embodied in the concept of an integrated solid waste management system.

This approach envisioned a system that relied on a combination of waste management technologies and incorporated a hierarchy of methods--preferring reduction, reuse, recycling and composting over incineration or landfilling. Disposal technologies are necessary for a comprehensive management system. However, the greater environmental and economic benefits inherent in source reduction and diverting waste from disposal through recycling and composting led the State to establish aggressive measures to increase waste diversion and reduce waste generation

By 1992, the goal was to recycle and compost 23 percent of the municipal solid waste (MSW) generated in State. By 1996, that diversion goal was set at 34 percent and, by the year 2000, 46 percent. During these same benchmark years, the goals for the amount of MSW to be reduced was set at 3 percent in 1992, 6 percent in 1996, and 10 percent in 2000. These targets were selected to offset the anticipated rise in waste generation. In this way waste generation would remain level over the 10 year planning period. Reliance on combustion with energy recovery would remain an important element within the system, growing to a maximum of 50 percent . Landfilling was anticipated to decline sharply over the decade, serving primarily as a depository of waste that was not amenable to recycling or combustion or remained as processing residue.

As we look back to 1990 from the present, there are many ways in which the management of solid waste and recycling has progressed in Massachusetts. Acknowledging these accomplishments helps put current and potential future developments in perspective. Success in reaching our goals has largely been due to the recycling network that has developed across the State: volunteer citizens working long hours on solid waste and recycling committees; local public works officials stretching their traditional job responsibilities to learn new skills and to seek information on recycling; established waste management firms struggling to keep recycling alive during the lean market years; entrepreneurs who are finding innovative ways to service the recycling revolution; and environmental advocates encouraging us to expand our definition of what is possible. It is our intention to advance the activities of each of these major players by: providing the necessary information for local government officials and the business community to make informed decisions; creating market conditions which promote expansion of the recycling infrastructure; continuing to streamline the regulatory process to remove procedural barriers to new technologies; and advocating for environmental legislation and policies that will enable the Commonwealth to meet its diversion and source reduction goals for the years 1996 and 2000.

This chapter outlines solid waste program accomplishments over the past several years as they occurred in the three main categories often used to describe solid waste management programs -- source reduction, waste diversion through recycling and composting, and waste disposal through combustion and landfilling. In addition, this chapter will discuss those goals that were not reached and the general initiatives that will be needed to bring us closer to realizing them in the future.

SOURCE REDUCTION

In 1990, 6.75 million tons of MSW were generated in Massachusetts. It was projected at that time that, without source reduction, total MSW generation in State would increase 3 percent by 1992, 6 percent by 1996, and 10 percent by 2000. These increases were based on projected increases in population, economic growth, and per capita consumption. Halting these proposed increases in MSW generation thus became a goal of the Commonwealth; the 1990 waste generation level of 6.75 million tons per year was to remain at that level until the year 2000.

The first of the initial Master Plan goals -- to offset the expected increase in MSW generation of three percent by 1992 -- has been met. Massachusetts residents and businesses generated nearly 6 percent less MSW in 1992 than they did in 1990. The success of meeting this goal is partially the result of a trend in consumer purchasing habits toward buying products in bulk, combined with industry's efforts at reducing the volume and weight of packaging. These intentional efforts to reduce waste have also been aided by the unanticipated effects of the economic decline experienced throughout the State and nation, which has resulted in a dampening of business activity and in people buying fewer products, both of which have resulted in the generation of less waste.

WASTE DIVERSION: RECYCLING AND COMPOSTING

The 1990 Master Plan established a 1992 goal of diverting from disposal, through recycling and composting, 23 percent of the MSW generated in Massachusetts, leading to a 46 percent diversion rate by the year 2000. The diversion rate grew dramatically over the past four years reaching 28 percent in 1992, even as the economy sputtered and waste disposal prices plummeted. The weak economic climate during the early part of the 1990s affected the Commonwealth's ability to appropriate funds to stimulate investment in recycling facilities, equipment, education programs, and other initiatives needed to fully develop the recycling infrastructure.

Paralleling the increase in the diversion rate from 1990 to 1992 has been the significant increase in the number of municipalities that established recycling and composting programs. In 1990, only 190 recycling programs were in place. By the end of 1992, nearly all communities had some type of recycling program, ranging from numerous drop-off centers operated by local volunteers to community-wide curbside recycling collection programs. Similarly, nearly every Massachusetts community now offers a leaf and yard waste composting program, which has made a significant contribution to waste diversion. With the continuing growth of curbside collection programs, including cities such as Worcester and Boston and the towns in the Millis Consortium, the 34 percent waste diversion target for 1996 appears well within reach.

The original Master Plan set forth a "Ten-Point Agenda," a set of priority actions needed to meet the broader-based recycling and source reduction goals established in that document, most of which have been met or exceeded.

The one composting goal in that Agenda -- "Expand leaf and yard waste, and holiday tree composting, by 50 percent over the next twelve months" -- has been met. Approximately one-quarter of all waste currently diverted each year from disposal in the Commonwealth, or over 500,000 tons, is comprised of leaf and yard waste composted in home, community, or commercial composting operations

The hallmark of the Commonwealth's recycling efforts, however, was the Springfield Materials Recycling Facility (SMRF), a publicly owned privately operated facility located in Springfield that provides recycling processing services to 99 surrounding communities. Its approximately 200 ton per day operation has been key to growth of the Commonwealth's recycling efforts and market development.

At the time the SMRF was conceived most private investors were not prepared to risk their capital in

multi-material processing facilities. They lacked confidence in the ability of municipal programs to deliver sufficient material and in the capability of processing equipment to generate marketable feedstocks. As it did with resource recovery facilities in the 1980's, the Commonwealth appropriated the investments necessary to demonstrate that a innovative regional approach to waste management was achievable and reliable. Over its first three years of operation, the number of communities sending waste to the facility has steadily increased; moreover the amount of recyclables processed and the different types of materials accepted for recycling have both also increased significantly. During this same period, the increasing value of processed recyclables as industrial feedstocks has led to a substantial reduction in the State's share of operating costs and an extremely favorable climate for the re-bid of the operator's contract now in progress. At the end of the next five-year contract, the necessity for further State financial support of SMRF will be re-evaluated

The Commonwealth intends to continue to service its designated communities while directing the SMRF to function in a manner that does not conflict with the welcome expansion of privately financed facilities. The contract will, for example, prohibit the operator from soliciting commercial paper, redeemable bottles and cans, or any other material for which there is private commingled processing capacity within 75 miles of the site. In addition, making the SMRF's processing capacity available to companies that collect recyclables should allow these private haulers to compete for multi-material contracts for which they were previously ineligible.

Establishing Recycling Markets

Without markets for the recyclables collected, the materials would have little value, and recycling programs would grind to a halt. For this reason, several of the goals outlined in the 1990 Master Plan focused on establishing a greater demand for recyclable material. One goal was to "Target the Commonwealth's market development powers on recyclable materials in the solid waste stream, with particular emphasis on glass, metal, paper, plastic, tires, and construction and demolition debris."

While plastic and tires have been the most problematic materials to market, one marketing success story pertains to old newspapers. In 1993, municipalities in the State typically were paid more than four times what they were paid for old newspapers in 1990, greatly improving the economics of their recycling programs. Brought about by a series of multi-million dollar investments in paper de-inking plants in eastern North America, the price change reflects a long term market shift which will stabilize demand for old newspapers for years to come.

As Chapter 6 outlines in more detail, DEP helped create favorable conditions for these investments. Through activities such as the Springfield MRF and the recycling equipment grants program the agency expanded supply, establishing a reliable, quality flow of the old newspaper these mills use as raw material. At the same time DEP worked on the demand side of the equation by negotiating a voluntary agreement with Massachusetts newspaper publishers to increase the recycled content of their newspapers to 40 percent by the year 2000. Massachusetts newspaper publishers more than tripled the average recycled content of their newspapers from 6.4 percent in 1991 to 23 percent in 1994, helping to fuel hundreds of millions of dollars of investments in recycling

Working through the Northeast Recycling Council (a non-profit organization supported by the ten northeastern states to work jointly on recycling market development), the Department has secured a similar commitment from telephone directory publishers, who have pledged to boost the average recycled content of directory paper to 40 percent by 1998. The Northeast Recycling Council has engaged in negotiations with a number of other industry groups aimed at increasing the recycled content of their products.

Another market development goal established in 1990 was to: "Support legislative initiatives that mandate state procurement of recycled products and stimulate demand and supply for

environmentally preferred packaging " Although attempts at mandatory legislation were unsuccessful, increased state procurement of recycled products has been implemented through executive branch actions. In addition, the Administration continues to support labeling legislation that would provide consumers with the information necessary to make an environmentally conscious decision based on the recycled content of a product's package.

The most direct action state government can take to develop recycling markets is to increase its purchases of recycled products. DEP has assisted the Department of Procurement of Goods and Services (DPGS) in implementing Executive Order 279 (1988) for the purchase of recycled products. In fiscal year 1992, agencies purchasing through DPGS bought more than $2.3 million worth of recycled products (primarily paper and printed materials) This amount, however, is low both relative to the total amount of goods purchased by the State, and to the levels purchased by other states (Massachusetts ranked 29th in recycled paper purchasing in a 1992 survey). Efforts to increase recycled procurement have suffered from several barriers: lack of effective incentives for state agencies to buy recycled: higher costs for some recycled products, poor data about recycled purchasing. Perhaps most importantly, there is a lack of resources within the purchasing function dedicated to researching recycled product availability and performance and educating users about recycled products. DEP has worked to overcome some of these barriers by providing extensive technical assistance to the Department of Procurement and General Services, as well as running workshops to assist other state agencies and municipal purchasing officials.

In the Spring of 1993, Governor Weld issued Executive Order No. 350, which directs state agencies to develop and implement environmental compliance and pollution prevention plans. The "Clean State" initiative has raised the profile of recycled purchasing throughout state government. As is detailed further in Chapter Two, several steps are now being taken as part of the Clean State initiative which are likely to increase recycled procurement, including hiring the first dedicated staff within DPGS to work on recycled procurement.

The Economic Value of Recycling

The movement of recyclables from the generator to the mill costs money. But the value added in diverting that material from the tipping floor of a waste facility to the production line of a manufacturer has positive multiplier effects in various sectors of the state and regional economy. DEP estimates that the collection of recyclables in the Commonwealth accounts for approximately $50 million worth of economic activity each year. In-state processing and manufacturing of those materials adds more than ten times that value to the State's economy. Together, they represent at least 10,000 jobs. Recycling in Massachusetts, for example, allows local paper mills to compete effectively with large Canadian mills to provide recycling newsprint and other paper stocks to Massachusetts businesses. Without a local supply of recycled paper, these mills would close, putting thousands of workers out of jobs. Market development activities aimed at increasing investments by manufacturers to use recycled materials represents both an economic and environmental opportunity.

Technical and Financial Assistance

In 1992, over 80 percent of Massachusetts residents had the opportunity to participate in a community based recycling or composting program. The availability of these programs is a reflection of the increased educational, technical, and financial assistance provided in the last five years at the federal, state, and local levels of government.

Public education has proven to be an effective and valuable means of motivating behavioral changes in business and communities. The "Solid Waste Resource Guide for Massachusetts Schools" has been distributed to every community in the Commonwealth. This year DEP has initiated a public education support program for municipal recycling programs. Rather than having each community pay for the development and

reproduction of public education materials for residential recycling programs, DEP paid for the creation of model materials that were tailored to municipal programs.

DEP has also provided extensive "hands on" technical assistance to expand residential, agricultural and commercial composting operations. Through the development of "Master Composter" training, DEP has created a network of residents who can instruct other members of their community in backyard composting. Working in close cooperation with the Department of Food and Agriculture, DEP has shown farmers how the composting of excess manures with off-site agricultural and food processing waste can produce beneficial soil amendments while reducing odor complaints and surface water contamination. In the same vein, nurseries which previously had to buy their own mulch are now saving money by composting leaves and yard waste generated in the surrounding communities

Since issuance of the 1990 Master Plan, 290 Massachusetts communities have received State recycling grants exceeding $5 7 million for the purchase of household collection bins, roll-off containers, and recycling trucks. The Department continues to fund feasibility studies for the implementation of regional recycling programs To date, State financial support has strengthened regional recycling efforts in northern Berkshire County, Franklin County; the South and North Shores of Boston, Cape Cod, Worcester County, and the Millis area. In addition, $1.6 million of assistance has been provided to municipalities over the past three years to advance composting projects.

Voluntary Incentives

The DEP has looked beyond assisting government agencies in the procurement of recycled products and has worked with large businesses throughout the Commonwealth that are large users of paper, which is a significant portion of the recyclable waste stream. In addition to the progress on stimulating demand for recycled paper, the Commonwealth has sponsored workshops and produced educational materials to motivate corporate purchasing managers to increase purchases of recycled products and to learn about recycled product availability, performance, and cost.

In the Spring of 1993, Governor Weld challenged businesses to increase their use of post-consumer recycled material in their packaging sold in Massachusetts. In January of 1994, 33 companies were recognized for meeting this voluntary "packaging challenge" by using at least 25 percent post-consumer recycled materials in packaging. Businesses will be recognized annually for reaching targets for recycled content in their packaging and overall voluntary progress toward this goal will be closely monitored. The Commonwealth will, at the same time, explore workable legislative initiatives to encourage recycled packaging to be actively pursued should progress slow toward enlisting companies in the Governor's packaging challenge.

Businesses have also recognized the importance of networking among their peers to share hands-on waste minimization and recycling information. A coalition of trade associations representing a broad range of manufacturing and service industries working with DEP staff launched "WasteCap" of Massachusetts. This non-profit organization will provide information and advice for individual companies on how to reduce costs and liabilities and improve their productivity and customer relations through waste prevention and recycling.

Legislative and Regulatory Initiatives

In an effort to stimulate a recycling industry in its infancy, one of the goals of the 1990 plan was to: "Propose a legislative initiative for required source separation of recyclables by all Massachusetts residents and businesses, with the related capital investment financed through the Solid Waste Act of 1987 (Chapter 584) and dedication of reclaimed bottle deposit funds (for capital costs associated with implementing recycling)." Shifting support for recycling from mandates to incentiives,, the Commonwealth has used bond funds from the Solid Waste Act of 1987 (C. 584), along with unclaimed bottle deposit funds, for programs that, as

described earlier, leverage investment in the development of the municipal recycling collection infrastructure.

The 1990 solid waste site assignment and facility regulations were designed with three waste diversion objectives in mind: remove barriers to the development of recycling and composting operations, modify existing disposal facility permits so their operations were more consistent with an integrated solid waste management approach and direct recyclables away from disposal and into markets.

The elimination of the site assignment and full permit requirements for a wide range of recycling and composting operations paved the way to fast track the start-up of scores of waste diversion operations. Scores of recycling operations, from municipal bottle and can drop-off centers to large commercial multi- material processors, took advantage of DEP's streamlined review procedures. Creating a special category of composting operations also removed the stigma some farmers and institutions associated with being classified as a solid waste facility, and motivated them to adopt innovative programs to compost a variety of organic materials

With limited legislative tools available to stimulate recycling, DEP relied, in part, on regulations to promote the integrated solid waste management system and recycling markets The 1990 Master Plan adopted a goal to: "Promulgate Solid Waste Facility Regulations, which require a minimum 25 percent recycling at every operating landfill and combustion facility, and which will ban a number of recyclable materials from landfills and incinerators over the next five years."

The recycling rules of the 1990 solid waste regulations have contributed to the recycling successes of the past several years. It must be acknowledged, however, that the burden of regulatory compliance was carried in large measure by the private waste disposal industry and municipal departments of public works.

Beginning in 1991, rules requiring the recycling of whole tires and lead acid batteries were implemented. The following year, the rules incorporated the diversion of white goods (such as refrigerators and washing machines) for recycling and leaves for composting In April 1993, DEP instituted the Department Approved Recycling Program (DARP) concept for compliance with the rule restricting disposal of bottles and cans. The DARP concept was devised as an incentive to expand municipal recycling programs and alleviate some of the compliance burden from facility operators. DARP status can be obtained through establishment of a low cost recycling drop-off area open to the public during municipal business hours and accompanied by a basic public education campaign. A community's adoption of a DARP allowed its waste hauler to avoid a compliance inspection for recyclables and the risk of load rejection if unacceptable numbers bottles or cans were found Landfill and combustion facility operators use the DARP communities list issued by DEP to expedite their compliance inspections In January, 1994, the DARP concept was expanded to cover leaves and yard wastes under a Department Approved Composting Program (DACP).

DEP has completed a series of public meetings on the approach to take regarding the rules governing restriction on the disposal of recyclable paper and plastic due to take effect in January, 1995. These materials will be incorporated in the DARP program. Under these rules communities that desire to retain DARP status will be obligated by 1996 to provide recycling programs for bottles and cans, including narrow neck plastic containers, newspaper, two additional types of recyclable paper. The DACP program will continue unchanged. Further information on the DARP/DACP program will made available in guidance documents to be mailed to communities and facility operators this summer.

These recycling rules have been controversial. Some municipal officials assert that the rules violate the State's mandate law (MGL c. 29, s 27C(f)). While DEP disagrees with this assertion, the DARP approach has reduced compliance costs to an acceptable level for the nearly 300

communities with approved programs. Members of the disposal industry also criticize the rules as an inefficient means of achieving source separation. While relying on disposal facilities to enforce recycling rules is not the optimal alternative, it has proved to be highly effective in stimulating the growth of municipal recycling and composting programs, as well as providing a clear indicator for investors that recyclable material will be available for processing and reuse.

The 1990 solid waste regulations also require that solid waste disposal facilities establish programs to divert 25 percent of the waste stream delivered to the facility for disposal. This can be accomplished on-site by alternative processing measures, or it can be met by assisting customers to establish diversion and source reduction programs at their respective businesses or before the waste leaves the community. Along with the recycling restrictions, the 25 percent recycling provision has also stimulated private investment in the recycling infrastructure and seems to be most effective at leveraging capital investments at new or expanding facilities and stimulating existing disposal facilities to provide expanded recycling opportunities to their customers

Typical investments at existing solid waste disposal facilities associated with the 25 percent recycling rule include provisions of large containers at municipal drop-off centers. Other forms of assistance offered include contractual relief from "put-or-pay" contract provisions, and training for communities and businesses on how to establish recycling programs. Proposals for new solid waste disposal facilities have included processing investments in facilities for construction and demolition debris, as well as in multi-material regional recycling processing facilities.

WASTE DISPOSAL: COMBUSTION AND LANDFILLING

The 1990 Master Plan set a goal for the use of combustion facilities to increase to 50 percent between 1990 and the year 2000, and for the use of landfills to diminish from 42 percent to 4 percent over that same time frame. In 1992 incineration capacity reached 48 percent of the MSW generated, and today, permitted incineration capacity continues at that level. Landfill closures, however, have not proceeded in accordance with the Plan, with about 23 percent of MSW still being landfilled in 1992.

There are nine combustion facilities operating in the Commonwealth which, in 1992, handled approximately 3 million tons of MSW. Metals entering these facilities, much of which eventually becomes part of the ash, are increasingly being recovered prior to, and after, combustion. By 1992, these recovery techniques had reduced the amount of ash landfilled from Massachusetts combustion facilities from 700,000 tons per year (tpy) to 640,000 tpy.

The benefits of waste volume reduction, pathogen destruction, energy recovery and the ability to retrofit pollution control technology has made resource recovery facilities an environmentally sound waste management technology. Recent federal regulatory action, however, will cause increased scrutiny of the facilities' ability to safely manage toxic metals in the waste stream. As a result of a United States Supreme Court ruling and subsequent EPA and DEP regulatory action, facility operators must conduct regular testing of ash to determine if the lead and cadmium are present in sufficient amount to characterize the ash as a hazardous waste.

In addition, under a schedule mandated under the recent amendments to the Clean Air Act, EPA will promulgate in the near future revised standards for air emissions from all municipal waste combustion facilities. Of particular interest is the standard for hazardous air pollutants, including mercury. Although the combustion of solid waste is not the only source of toxic mercury compounds in the environment, its deposition in surface waters and uptake in fish far from the combustion source is a growing concern. DEP intends to be proactive in both these areas working with the solid waste industry, hospitals, environmental groups, municipal officials, the Legislature and other state and federal regulators to devise pollution prevention

and control solutions which fully protect the public health and environment but do not seriously disrupt the management of nearly 50 percent of the State's residential and commercial waste.

Modern landfills will continue to provide a vital service to the solid waste system. While landfills do not normally recover either material or energy values[1] from their waste, their flexibility in managing a range of volumes and waste stream components provides an inherent safety valve in state-wide capacity planning. The history of landfill operations in the Commonwealth is marked, however, with excessive reliance on poorly sited unlined municipal landfills operated without the resources to provide for basic ground water protection and other environmental controls. One of the disposal goals the DEP set in 1990, therefore, was to: "Aggressively close poorly sited or poorly managed landfills, giving priority to sites over water supply zones of contribution, and those with documented leachate releases that threaten public health and the environment " While the Master Plan anticipated that 99 landfills would be operating in the Commonwealth in 1992, instead 122 active landfills were active. Only 26 of these facilities are lined, and many of these do not have liners that meet today's standards.

Recognizing that some communities had become financially dependent on the artificially low cost of unlined landfills, DEP attempted to motivate closures through technical assistance. Since publication of the 1990 Master Plan, the agency has conducted fourteen municipal seminars on the technical, administrative, and financial aspects of landfill closure, and distributed over 500 copies of its "Landfill Technical Guidance Manual".

DEP staff also worked closely with communities to address site assessment issues, develop budgets for landfill closure costs, and secure consulting services as needed. This assistance, unfortunately, has been insufficient to compel desired municipal action, mainly due to municipal financial constraints and the conservation of local landfill capacity through waste diversion programs.

In 1993, the Legislature enacted an amendment to the solid waste statute to provide a public process under which unlined municipal landfills would be scientifically assessed and then characterized on the degree of threat a particular site posed to public health and the environment. Sites that were determined to be a significant threat would either proceed on an accelerated track of negotiated closure or be subject to enforcement action by DEP. Threat characterization criteria were developed through consultations with municipal officials and other environmental professionals.

After an evaluation of each site and an exchange of technical information between DEP and the facility operators, DEP in April 1994 published the classification list. As more fully discussed in Chapter Five, the list identified 22 landfills that present a significant threat to drinking water supplies and must be closed as soon as feasible. DEP has commenced the closure negotiation process and anticipates completing the consent order process by the end of this calendar year Potential threat sites will also be reviewed to ensure that they are operating within their presently approved capacity and are in full compliance with solid waste laws and regulations.

OTHER GOALS AND ACCOMPLISHMENTS

MIFA Financing. The first Master Plan set as a goal to: "Deny new MIFA financing of municipal solid waste combustion facility proposals while supporting MIFA financing of MSW recycling and composting facilities." To date, funds from the Massachusetts Industrial Finance Agency (MIFA) have been targeted to private recycling and composting facilities. This initiative is an important means of advancing the Commonwealth's solid waste hierarchy. DEP's market development staff now work closely with MIFA and several of

[1] Landfill mining and landfill gas combustion for energy are potential resource recovery options. There is currently only one operating gas to energy operation and one landfill mining project in Massachusetts.

the State's other economic development agencies to introduce them to potential recycling and composting projects and assist in the financial review of these proposals by analyzing market viability.

Public Bidding Laws Another item on the DEP's 1990 agenda was to: "Propose revisions to public bidding laws to allow use of public lands for privately-operated solid waste facilities." The DEP has helped communities to operate within public bidding law restrictions by providing technical assistance in drafting Requests for Proposals, while pressing for changes in these laws. The laws have been substantially revised on two occasions and no longer present the barriers to municipal contracting that existed in 1990.

CHAPTER TWO

BUILDING MOMENTUM TOWARD THE YEAR 2000

While there have been many achievements over the past three years related to recycling and composting, doubling waste diversion and tripling source reduction over the next six years will require the continued efforts of government, residents, environmental groups, and the business community.

A key element of the Administration's strategy to meet these challenges is a plan for expanding recycling that aims to overcome some of the barriers to recycling perceived by those most involved in the field.

BARRIERS TO RECYCLING

In preparing its recycling plan to the year 2000, EOEA and DEP contacted representatives of municipalities, industries, service providers, environmentalists, and others with expertise and asked this focus group to identify the current barriers to expanding recycling.

The results of EOEA's and DEP's discussions with the focus group indicated that the barriers faced by the recycling community today are different from those faced just a few years ago. In 1990, manufacturers considering whether to use recycled materials in their products could not be sure that enough material would be available to justify the tens of millions of dollars in financing necessary to convert their plants to be able to take the recycled material. Similarly, municipalities that wanted to recycle found it difficult to even find a recycling company to collect their recyclables. When they did find a recycling service, the legal hurdles faced under the Massachusetts procurement requirements, outlined in Chapter 30(B), made it difficult to arrange a flexible contract. These barriers to recycling were identified in the 1990 Master Plan, and programs were started to assure dependable supply, to demonstrate that quality feedstocks could be generated at prices competitive with virgin materials and to simplify contracting.

As the supply of quality materials grew town by town, private investment was stimulated. However there was a lag time between the decision to invest and the opening of a new or expanded plant using recycled feedstock. This created an extremely difficult transition period over the last four years for municipalities, haulers, and processors as the exponential growth of supplies across the Northeast region outpaced lagging demand.

The mid-term success of DEP's "supply side" strategy, however, can now be measured by the hundreds of millions of dollars of private investment in plants designed to recycle paper, glass, and plastic. This investment has translated into a substantial rise in prices paid for recyclable material and a reduction in the cost to municipalities to participate in multi-material recycling programs. What was, just a few years ago, a market considered glutted with recyclables has now turned around to the point where the projected feedstock demand for some materials is outstripping the supply.

While this turn of events has demonstrated that recycling can successfully compete in the market place, to reach the Plan's long term diversion goals and make recycling an ongoing growth industry in Massachusetts requires a perspective that looks beyond today's prices and towards building a permanent and stable market for recycled feedstocks and products. This strategy must be designed not only to increase the generation, processing and re-manufacturing of traditional residential recyclables, but also to stimulate the innovation and investment necessary to capture the far broader spectrum of materials now consigned to disposal.

On the supply side of the equation it means conditions must be created to expand curbside

Solid Waste Master Plan 1994 Update -- Building Momentum Toward the Year 2000

1990 MASTER PLAN	UPDATE	NEXT STEPS	TOOLS	CHAPTER
Keep generation of MSW level by achieving the source reduction goals of 3% in 1992, 6% in 1996 and 10% in 2000	MSW generation in 1992 was down from 1990 in part due to source reduction incentives and the economy	• Increase source reduction and waste reduction to offset growth in waste generation and in waste sent to disposal facilities	• Promote establishment of solid waste user fees and enterprise funds	Chapter One
			• Voluntary Incentives such as the Governor's Packaging Challenge	Chapter Eight
			• Support of private sector itiatives such as WasteCap	Chapter Two
Divert 23% of MSW via composing and recycling by 1992, 34% by 1996 and 46% by 2000	Recycling rate increased significantly since 1990. In 1992, 28% was diverted from disposal to composing or recycling operations	• Reduce barriers to increased recycling and advance market development	• The Ten Point Recycling Plan	Chapter Two
			• Voluntary Incentives such as the Governor's Packaging Challenge and agreements (i.e. Massachusetts newspaper publishers)	Chapter Six
		• Advance diversion of yard and other organic waste to composting operations	• Continue composting grant program, and technical assistance to residents, businesses and farms	Chapter Seven
			• Promulgate compost facility and end use regulations	Chapter Seven
Increase combustion with energy recovery up to 50%	Nearly ~ 45% of MA MSW was combusted in 1992	• Maintain combustion level and safe management of incinerator ash	• Keeping the development of any new disposal capacity in line with need for that capacity and the State's ISWM system through the Needs Analysis Process	Chapter Four
Reduce Landfilling to 4%	~20% of MA MSW was landfilled in 1992;	• Reduce reliance on unsafe unlined landfills	• Unlined landfills have been classified according to their threat to public health and the environment; those posing the greatest threat have been targeted for closure first	Chapter Five
Limit public exposure to household hazardous waste (HHW) and ensure environmentally sound collection	Implement waste management hierarchy, as appropriate, to HHW	• Reduce toxics in household products and facilitate collection for recycling	• Legislation curtailing sale and disposal of mercury and cadmium batteries	Chapter Nine
			• Funding for municipal auto recycling centers and paint sheds	

recycling programs and substantially broaden the participation of small and medium businesses. Processors and manufacturers, on the other hand, must find buyers for their recycled goods. Manufacturers need to incorporate recycled feedstocks into their products because it makes economic sense on the production line and at the sales counter. Consumers, individuals and institutions play the major role in this latter factor by choosing to "Buy Recycled". While buying recycled products is a popular notion it is often difficult to translate into practice. In many instances, it still takes time and effort to research the availability, price and quality for many recycled products.

With this background in mind, the focus group contacted by State officials identified the following barriers to increasing recycling in the Commonwealth

Market Uncertainty: In recent years, municipalities have experienced the revenue received for core recyclables first drop precipitously and now begin to sharply rise. While this is typical of price fluctuations in the commodities market, it is not conducive to the relatively stable service contracting relationships that typify many disposal contracts. To protect themselves against the potential of a major market downturn, communities and their vendors negotiate contracts that can make recycling more costly and less stable than would be negotiated if some level of price protection were available.

Transportation Costs: Even when recycling operations are affordable and markets are strong, some municipalities are far from recycling facilities. While transfer stations for consolidating trash are common, many regions of the State have no means to consolidate their recyclables to keep transportation costs down. Rural communities, which have depended on local landfills, find transportation of solid waste especially costly.

Insufficient Public Education: For recycling to cost-effectively expand at the rate projected in the Plan, participation in recycling and composting programs must broaden and deepen. The more people who participate in waste diversion activities at home or at the office, the lower the cost per ton for collection will be. In addition, business people need to be educated about what recyclable feedstocks are available. The more that businesses purchase recycled materials, the higher the value of the collected materials. Residents also need to be educated about which materials can be recycled and how they should be prepared. Public education has proved to be an effective way to improve the economics of recycling. Creating increased demand and improving the quality of the feedstock will also improve recycling economics.

Poor Regional Cooperation: In order to attract investments in recycling technologies and to create an economy of scale for municipalities to enter into recycling ventures, municipalities must continue to pool their resources and staff to obtain recycling services, equipment, and management support that they require to expand recycling opportunities. Because of the lack of strong regional government entities in most parts of the State, it is essential that State officials play a role in encouraging this regional municipal cooperation.

"Put-or-Pay" Contracts that Discourage Recycling: Many communities have signed long-term contracts committing set quantities of waste for disposal at combustion facilities. Expanding recycling can reduce the tonnage of solid waste disposed to a level below the minimum guaranteed tonnage. Depending on the particular contract terms and the practice of the facility operator, a community may be obligated to pay the combustion facility operator a disposal fee for materials the community diverted into a recycling or composting operation. This situation causes the municipality to pay twice for management of the same ton of waste.

Lack of Trained People and New Technologies: The recycling industry in Massachusetts has yet to capitalize on what may be the Commonwealth's richest resource: a pool of highly trained college graduates. Unlike the successful software, defense, computer, and printing and publishing industries in the State, the paper, glass, and plastic recycling industries have not made inroads into the university

and community colleges. In addition to developing human resources , new processing and manufacturing technologies must be researched and developed to create markets for materials such as plastic resins and tires.

Excess Capacity at Unlined Landfills: Nearly one hundred unlined landfills in the State continue to contribute to excess capacity while threatening valuable water resources. While closing these landfills is a health and environmental issue, the removal of these cheap, often polluting disposal options will reduce an economic barrier to recycling. The cost of disposing of solid waste in local, unlined landfills appeared to be inexpensive because the "external" costs. which account for the need to contain and cleanup the pollution, were not included in a municipality's solid waste budget. Ultimately. closing these artificially inexpensive facilities in the phased manner prescribed by law will make recycling more economical because solid waste disposal options for these communities are likely to be more expensive than their current artificially low landfill costs.

While these barriers may differ in focus and specificity. there was significant agreement among the focus group participants that each barrier poses at least some problem for at least some material, entity, or region of the Commonwealth. Having identified the barriers to recycling. EOEA and DEP also obtained guidance from the focus group participants as to how to overcome these barriers.

COMMONWEALTH'S CEF RECYCLING STRATEGY

A Ten Point Recycling Plan , listing of strategies, priorities and proposals. was developed for using available Clean Environment Funds to expand recycling and composting in Massachusetts. The Clean Environment Fund (CEF) was created by the Massachusetts State Legislature in 1990 to receive the unredeemed bottle deposits, or "escheatage," resulting after enactment of the Bottle Bill. Massachusetts General Law, Chapter 94, grants the Executive Office of Environmental Affairs (EOEA) responsibility for expenditure of these funds.

Although the CEF initiatives target many of the obstacles focused on by the recycling panel, success in overcoming those barriers is not dependent on a particular level of funding. Also, two of the barriers will be addressed outside of the Ten Point Recycling Plan. Regional cooperation will be pursued through the technical assistance grants funded under Chapter 584 while closing unlined landfills will be accomplished through the negotiation and enforcement program described in Chapter Five.

The Administration's recycling plan will help set the strategic agenda for the Commonwealth toward meeting its recycling goals to the year 2000. The 1995 fiscal year appropriation from the CEF of $2.9 million in new spending, $1.95 million in continued support for the Springfield MRF. and $100,000 to the City of Boston for recycling education will enable all the initiatives discussed below to move forward this year. DEP and EOEA will continue to consult with the focus group participants on CEF matters including long range planning objectives and allocation of funds among programs.

1. Municipal Recycling and Composting Equipment Grants

Since 1990, DEP has operated a successful recycling and composting grant program. fulfilling the needs of municipalities which are beginning or expanding recycling and composting programs. The Recycling Equipment Grant Program and the Composting Program have provided over $7 million in equipment to municipalities starting new curbside and drop-off recycling programs over the last four years. During that period, recycling rates in the Commonwealth have increased dramatically, to 28 percent. While the equipment grant program budget is now declining (as more and more of the equipment needs are satisfied), DEP proposes to continue to offer these grants for the next two years. The portion of 1995 grants program funded through the CEF will focus on providing trailers to communities to move recyclables to processing facilities. The remainder of the equipment grants program covering collection vehicles, curbside recycling containers, home composting bins and

plastic processing equipment will continue to be funded under Chapter 584.

2. Public Education Recycling Campaign

Since 1993, DEP has run a very successful municipal public education program which finances individual custom mailings to residents, informing them of the details of their municipal recycling, composting, source reduction, household hazardous waste, or user fee programs. DEP has awarded these materials to over 200 municipalities to date, offering professional graphic arts and customized schedules for less than 40 percent of the cost municipalities would typically pay on their own. This program will be continued in the first year of the Recycling Plan and may be expanded to increase the impact of local recycling efforts including, for example the sponsorship of regional solid waste coordinators selected directly by their communities or reimbursement for other information related expenses. Other programs could be designed specifically for schools (i.e., recycling and composting curricula), municipalities or small businesses (i.e., hotlines, manuals, and conferences), or the general public (i.e., public service announcements).

In order for recycling to truly succeed, manufacturers must increase the use of recycled content in their products and packages and consumers must increase their demand for recycled products. In the second year of the Recycling Plan, more resources will be directed to improving the information base upon which manufacturing and retail businesses make production and procurement decisions. Such a campaign would educate residents about local recycling and composting programs, as well as providing technical assistance to businesses on increasing their purchase of recycled products.

3. Household Hazardous Waste Program

While reducing the volume of waste disposed is the central focus of the integrated solid waste management system, preventing pollution by source reduction and recycling of household hazardous waste remains a key objective. Although hazardous products, such as waste oil, paints, and batteries containing heavy metals, only comprise a small part of the waste stream,[2] their presence increases the toxicity of the emissions from incinerator stacks, and the hazardous characteristics of incinerator ash and the leachate from landfills. In addition, improper disposal of waste oil down storm drains and sewer lines continues to have a detrimental effect on our water resources.

Historically the Commonwealth has attempted to manage these materials through sponsorship of household hazardous waste collection days. While these events raised the public's consciousness of the risk associated with these hazardous products it proved to be very expensive and ineffective in capturing significant quantities or in stimulating reduction or recycling alternatives.

DEP has embarked on a new strategy, further described in Chapter Nine, which targets the most prevalent hazardous products for which recycling options already exist. In the first year, DEP plans to focus on paint, used oil, and household batteries. Funds will be used for the following three items: (a) grants to municipalities to purchase paint sheds, so that municipalities can reuse and recycle their used paint; (b) grants to municipalities to develop "automotive recycling centers," which consist of a used oil collection tank, 55-gallon drums for antifreeze and oil filters, and a shed to cover these materials; and (c) research into policy and legislative options for used oil, paint, and household batteries. DEP will continue to actively work toward legislation that promotes the source reduction and recycling of mercury and cadmium in household and medical equipment batteries and the recycling of automotive batteries containing lead. In the second year and beyond, DEP intends to develop a telephone advice manual and hotline, assess regional collection options for high toxicity wastes and implement management options developed from research projects.

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[2] It is estimated that household hazardous wastes comprise approximately 1 percent of MSW.

4. Recycled Product Procurement Program

The more people who choose to buy products made from recycled materials, the more environmental and economic benefits Massachusetts receives from recycling. The myths of higher costs, poor performance, or scarce availability associated with recycled products are still repeated by some as an excuse to continue their traditional purchasing habits. But for many, the initial effort required to learn to incorporate environmental criteria into their purchasing decisions represents the greatest barrier to increased use of recycled products. DEP's efforts to increase recycled purchasing focus on changing behavior by three types of actors: government, businesses, and individuals.

In the first year, the majority of DEP's resources will be used to change public sector purchasing behavior DEP will continue to promote recycled purchasing as one of the lead efforts of the Clean States Initiative. DEP will direct resources to the Department of Procurement and General Services to research recycled products and educate buyers and users, and a multi-agency task force will work to set goals and identify systematic changes that will lead to increased recycled purchasing by the Commonwealth Building on earlier work, the Department will also provide funding to catalyze increased use of recycled products in the State's construction and transportation projects, as well as provide training to municipalities and other government entities about recycled purchasing

In the following year, in addition to ongoing training and education, funds will be used to conduct tests on innovative products and expositions will be organized to broaden the purchasing community's exposure to recycled products.

To increase recycled purchasing by businesses, DEP will continue to work with industry to encourage voluntary efforts, such as the commitment made by the newspaper publishers to increase the recycled content of their newspaper, and will encourage more businesses to participate in the Packaging Challenge. To reach out to a broader range of businesses, DEP will create a Buy Recycled Program modeled on the National Recycling Coalition's Buy Recycled Business Alliance, as well as stepping up its educational work with industry associations.

Over time, more resources will gradually shift to efforts to educate individual consumers and encourage them to buy recycled products. This past year, DEP provided seed funding to the Environmental Defense Fund for public service advertising around a buy recycled theme, and the State will work with other partners in the future on similar public education campaigns. DEP will continue to encourage industry to provide accurate, detailed information about the recycled content of products to make it easier for consumers to make this a factor in their purchasing decisions.

5. Municipal Recycling Transfer Station Grants

While Massachusetts now has sufficient, affordable capacity at several Materials Recycling Facilities (MRFs) and at paper mills purchasing directly from haulers, many communities still face long and expensive hauls to these facilities. Transportation reflects up to 75 percent of the cost of municipal recycling.

This program will have two components. The first will target those municipalities or regions which need new solid waste transfer stations to replace closing unlined landfills, as well as those with high recycling transportation costs. These multi-use stations would accept solid waste for disposal and consolidate recyclable and compostable material for processing. Grants will also be available for facilities only consolidating recyclable material for processing and not accepting solid waste. In both instances centralized consolidation of recyclables would significantly reduce recycling costs for municipalities and improve the economics of privately-operated MRFs, without adding expensive and redundant equipment.

In the first year of the program, funds will be expended to either retrofit several existing transfer stations or construct one or two new stations. Additional stations would be funded in the second year. At $100,000 to $800,000 per recycling

transfer station grant award. this program will represent a major benefit to municipalities having to close their unlined landfills and/or to those with high recycling transportation costs.

6. Municipal GAT Recycling Assistance

"Guaranteed Annual Tonnage" (or GAT) contracts are considered an impediment to recycling in some communities. These contracts commit a community to deliver a minimum quantity of solid waste to a resource recovery facility for disposal. If the community fails to deliver that amount, they may be held financially responsible for the shortfall as well as additional penalty fees. The result is that communities may be compelled to pay the combustion facility operator for recyclables diverted from disposal through a recycling or composting program. In these situations municipalities not only lose the benefit of avoided disposal cost but they must pay twice for managing the same material. The 1987 Solid Waste Act (C. 584) banned this type of penalty for new contracts but did not alter the provisions of existing ones.

Whether GAT contracts truly present a barrier to the expansion of recycling has been contested. Resource recovery facility operators point out that few communities have been required to pay for under-delivery and that the increasing availability of substitute tonnage from waste exporting states reduces the likelihood that penalties will be imposed in the future. At least one regional organization of 23 communities is, however, currently subjected to tip fees almost twice the State average based on contracted tonnage commitments rather than on the amount of waste actually delivered to the facility.

This program will address those communities not covered by the 1987 Solid Waste Act. Several options will be pursued. Where requested, DEP will participate in negotiations with operators and communities to explore means by which a penalty can be avoided. The program will also provide for partial financial relief for those communities with higher than average solid waste disposal costs that demonstrate significant impacts from GAT contract enforcement as well as serious momentum towards advancement of their recycling program. The necessity to provide financial relief will be reviewed annually. Finally, the feasibility of directing waste generated by State offices and institutions to combustion facilities as substitute tonnage under GAT contracts will be explored.

7. Recycling Research and Development

There is tremendous public interest in the development of new technologies in critical market areas, such as plastic recycling and innovative packaging. In the first year, funding will be provided for studies at the University of Massachusetts centers focused on obstacles to increased plastic recycling. In the second year, as the program develops, additional activities will be funded. To develop this project, DEP is considering ways to guarantee both the capital outlays and research and development equipment, and long term purchasing of mixed plastic manufactured goods.

8. Higher Education Recycling Initiative

Massachusetts universities, colleges, and community colleges have laid the foundation for the Commonwealth's successes in the development of software, biotech, printing and publishing, and high tech industries. These same intellectual resources should be applied to municipal solid waste management. At a time when "environmental careers" are the most popular choice among college-bound youth, there are currently no degree programs in recycling technologies at our educational institutions.

This initiative, combined with Chapter 584 funds, will support research at several institutions with environmental programs on topics such as municipal solid waste user fees, recycling transportation costs, regional composting, and paper mill expansions. The research studies would support student education, while furthering the development of reuse, reduction, and recycling policies. This partnership between the Commonwealth and its higher educational institutions is certain to benefit graduate and undergraduate interns, faculty course development, and the research needs of the EOEA and DEP.

Based on the results of this program. DEP will decide whether to fund in subsequent years a formal recycling curriculum to train individuals for careers in the recycling industry.

9. Recycling Investment Loan Program

Recycling-related processing and manufacturing accounts for more than 10,000 jobs in Massachusetts. These businesses, along with related collection and retailing businesses, are generally perceived as "riskier" by financial institutions because banks have less experience with recycling than other industries and because of uncertainty surrounding supply and demand for recyclable materials. Both the perception of higher risk and the greater time financial institutions must invest in learning about these businesses often put recycling-related businesses at a disadvantage to other firms in competing for financing.

As it competes to retain existing companies and create new businesses, the Commonwealth can provide two forms of assistance to aid recycling-related businesses in obtaining financing for expansions and improvements. The first is technical assistance utilizing the State's extensive economic development network. Building on earlier collaborative work with the State's economic development agencies, DEP will fund personnel at certain of the State's economic development agencies to work specifically with recycling businesses (via workshops, direct assistance, and work with industry associations), and to leverage the State's expanding industrial extension service to focus more of its resources on recycling. DEP will also step up its efforts to educate the economic development agencies about the needs of and opportunities presented by recycling-related businesses.

The second form of assistance is financial. DEP will work with the State's economic development agencies to develop a credit enhancement program that will increase the ability of recycling-related businesses to qualify for private financing and to take full advantage of other state and federal financial assistance programs. To be sure that such financial assistance is well targeted, the first step will be a study conducted with the assistance of the most interested economic development agencies to design a tool that addresses the concerns of financial institutions and meets the needs of recycling businesses.

The Commonwealth will also continue to support recycling through allocation of non-taxable bond funding coordinated through the Massachusetts Industrial Finance Agency.

10. Springfield Materials Recycling Facility and the Cooperative Market

The Springfield Materials Recycling Facility (SMRF) is a publicly-built, privately-operated facility that provides recycling services to 99 communities in Central and Western Massachusetts. In 1990, when the SMRF opened, it was the largest plant of its type in the country, and its continued operation became a model for public and private facilities elsewhere in the USA. In 1993, the SMRF consistently received and recycled materials at an average cost of about $34 per ton, which was considerably less than the average fee charged by non-recycling disposal facilities in the Northeast.

In 1994, the DEP issued a new Request For Proposals to continue the operation of the SMRF, which was distributed to over 20 private operators across the country. The new cost proposals for the next five year contract will be opened and made public in August 1994.

By continuing to operate the SMRF, the DEP provides a form of local aid to central and western Massachusetts in communities which undertook recycling before it became the norm. The SMRF supports paper, plastic, and glass mills which rely on its consistent, high-quality supply of recycled material.

The SMRF will also offer a Cooperative Marketing mechanism through the new operator's contract. This unique "market safety net" will be available to guarantee recycling markets to other public and private recycling efforts. In the event that market disruptions occur for any recyclable material

handled at the facility (e g . a private market collapses, or the value of a material drops excessively), the SMRF will provide a market at a guaranteed base price for the material. The operator may chose to process the material or have it sent directly to the end market.

The sale of collected recyclables at a base price would allow municipalities and vendors who service them to better plan for reasonable "worst case" scenarios over longer term contracts, without disrupting the flow of commodities during normal markets. It would also provide the financial markets a greater level of confidence to loan funds to recycling processors. Guaranteed prices would be set low enough to ensure the success of the free market so that the cooperative would not compete against municipal or private operators during normal market periods

The SMRF also plays a role in the development of new markets. For example, additional plastics resin types and aseptic packages have been added to the list of materials accepted at the facility, and have already proved reliable enough to expand to private recycling operations in the area

ADDITIONAL PROGRAMS TO MEET PLAN GOALS

Achieving the objectives described in the Ten Point Recycling Plan is key to continuing the progress toward an integrated solid waste management system. They are not, however, the only measures of success. A comprehensive approach to waste stream management must also address increasing source reduction and devising appropriate solutions for difficult to manage wastes.

Source Reduction Programs

The focus placed on bolstering recycling and composting programs to meet future Master Plan goals should not divert our attention from the variety of measures the Administration will promote to meet our source reduction goals, especially in light of the expectation of an ongoing economic recovery that may result in added waste by businesses and residents as production and consumption patterns rise.

Solid waste user fees have proven effective at increasing recycling rates and reducing the amount of waste needing disposal. By requiring people to pay a variable rate for the amount of waste they generate, the economic incentive to help keep solid waste costs down translates from being solely a municipal responsibility to one in which the individual has greater control over his or her own solid waste costs. And by shifting the cost from the municipality to residents, overall solid waste costs for residents will go down. In other words, while some people who generate large quantities of solid waste will pay more, most user fee programs, if designed correctly, will save money for the majority of residents. As discussed in detail in Chapter Eight, each community should tailor its fee program to its unique circumstances. The Department will work with communities to provide the technical assistance necessary to implement these important programs.

Recognizing that source reduction translates into cost reduction and increased productivity, businesses and the Administration are working together on a number of fronts. The Governor's Packaging Challenge will continue to provide a stimulus for companies to develop and use more efficient and environmentally-sensitive packaging. DEP will continue to support WasteCap, the business to business technical assistance organization, in its efforts to educate and advise companies on the economic gains which can be realized through waste minimization practices.

Composting organic material on the site of its generation also represents another opportunity for residents and business to significantly reduce the volume of material that goes into the waste system. DEP will continue to provide technical assistance to residents interested in composting leaf and yard materials and businesses or institutions desiring to compost cafeteria and landscaping wastes.

Applying the Hierarchy to Difficult to Manage Wastes

Although the focus of the Commonwealth's solid waste planning efforts has been directed almost exclusively to the MSW waste stream, the non-MSW wastes, including construction and demolition debris, biosolids (sewage sludge) and tires, have a significant impact on the entire waste management system. For example, construction and demolition debris consumes valuable landfill capacity. Waste water treatment biosolids generated at municipal sewage plants often are being disposed in unlined municipal landfills slated for closure.

As it did with MSW wastes, DEP's first objective will be to better quantify generation and current management approaches and then seek to identify the most environmentally sound and economically feasible alternatives. Wherever possible the Commonwealth intends to apply the integrated solid waste management hierarchy to these wastes by first encouraging efforts at reduction, reuse and diversion. Through its streamlining of the solid waste regulations the agency has already encouraged the recycling of construction and demolition debris (C&D) and tires. For example, currently there are over 25 C&D processors recycling nearly one million tons annually.

In the coming year DEP will commence an analysis which will lead to programmatic goals for increasing source reduction and recycling of C&D waste. The agency also plans to assist the municipalities intending to close their landfills in developing environmentally sound alternatives to the current practice of landfilling wastewater treatment biosolids.

CHAPTER THREE

INTEGRATED SOLID WASTE MANAGEMENT SYSTEM PROFILE

The 1990 Master Plan offered a complete picture of the Commonwealth's solid waste management practices. It established the goal of constructing an ISWM system, which encompassed the integration of new recycling and composting facilities into the existing framework dominated by solid waste landfills and combustion facilities. The original Master Plan also included the following hierarchy of solid waste management options that prioritized the use of these facilities:

- Reduce the amount of solid waste generated.
- Recycle and compost appropriate components of the waste stream.
- Combust with energy recovery the balance of the waste that cannot be reduced or recycled.
- Landfill wastes that cannot be reasonably reduced, recycled, or combusted.

This Update provides the most complete profile of the State's solid waste management system since publication of the 1990 Master Plan, including an outline of current trends. Figure 3-1 below is a profile of the system in 1992.

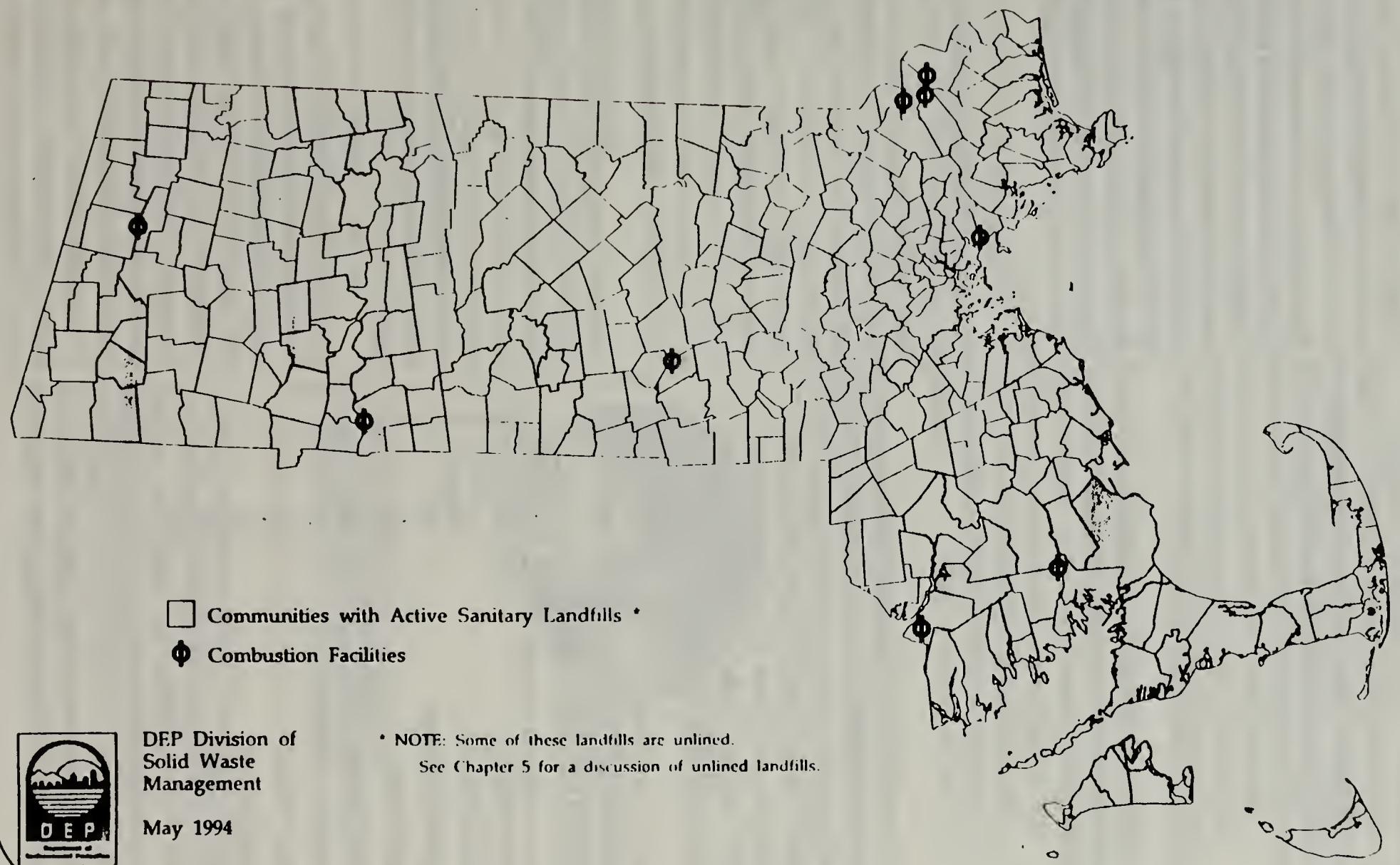
MUNICIPAL SOLID WASTE GENERATION

In 1992, Massachusetts residents, businesses, and industries generated a total of 6.4 million tons of municipal solid waste (MSW), including non-hazardous waste generated in homes, institutions, and commercial establishments. Of this total, residential waste accounts for 45 percent, while commercial and institutional waste account for 55 percent, which is a slight shift from a 1990 residential rate of 48 percent and a commercial rate of 52 percent. The total MSW generated by residents, businesses, and institutions in 1992 also shows a five percent decrease from the 6.75 million tons reported in 1990. This reduction has been attributed to source reduction efforts and the economic recession. It has been assumed that source reduction successfully offset any anticipated

Figure 3-1: Massachusetts Municipal Solid Waste Management System Profile For 1992

Note: 6 percent of Massachusetts Generated MSW was exported in 1992.

Figure 3-2: MASSACHUSETTS SOLID WASTE DISPOSAL FACILITIES



☐ Communities with Active Sanitary Landfills *

Φ Combustion Facilities

DEP Division of Solid Waste Management

May 1994

* NOTE: Some of these landfills are unlined.
See Chapter 5 for a discussion of unlined landfills.

growth in per capita generation, and that the current economic recession has been responsible for the actual decrease in tonnage generated. Therefore, DEP will continue to forecast an expected generation rate of 6.75 million tons of MSW as the basis for projecting the need for disposal system capacity to the year 2000.

RECYCLING AND COMPOSTING

The 1990 Master Plan set forth the following ambitious goals for diversion (recycling and composting) of MSW:

- By 1992, 23 percent of MSW
- By 1996, 34 percent of MSW
- By 2000, 46 percent of MSW

Waste diversion provides important environmental benefits by reducing the need for solid waste disposal capacity, conserving natural resources through reducing the use of virgin materials, and converting organic wastes into a beneficial resource. Table 3-1 summarizes the variety of recycling and composting programs in the State.

Table 3-1: 1992 PROFILE OF THE MASSACHUSETTS RECYCLING AND COMPOSTING PROGRAMS

	No. of Municipalities
Total Municipalities	351
w/Recycling Programs	341
w/Mandatory Ordinances	191
Curbside Programs	109
Collecting/Diverting Leaves	340
Collecting Glass Containers	326
Collecting Newspaper	322
Collecting Steel Cans	312
Collecting Aluminum	302
Collecting Plastic Containers	262
Collecting Corrugated Cardboard	179

In 1992, 28 percent of MSW generated in Massachusetts was recycled or composted. Of the 340 municipalities collecting or diverting leaves, 245 are communities with yard waste drop-off or curbside collection composting programs at municipal or commercially operated centralized facilities. The Commonwealth estimates that approximately 170,000 tons of yard waste were composted at these centralized operations in 1992. In addition, approximately 180,000 tons of yard wastes are diverted through home composting in communities both with and without yard waste collection or drop-off. A total of 95 communities do not offer any collection or drop-off of yard waste for their residents, mostly rural communities where yard waste is managed through home composting programs.

The number of municipalities offering some form of recycling rose from 190 in 1990 to 341 by 1992. Curbside collection of recyclables has gone from no more than 20 programs (13 of which were associated with the Springfield MRF) as of the 1990 Master Plan to 109 programs by 1992. This trend towards curbside collection is continuing with a number of new programs coming on line in the last year (i.e., Worcester). Several more municipalities have programs scheduled to start in fiscal year 1995 including Boston, and Watertown.

Mandatory municipal recycling ordinances increased from nearly 100 in 1990 to 191 by 1992. Whereas the average recycling program in 1990 collected four materials (including glass containers, newspaper and white goods), by 1992, a typical recycling program also collects aluminum, plastic and steel containers, corrugated cardboard, and leaves.

In addition to yard waste, increasing quantities of farm manure and commercial organic waste are being composted at farms and nurseries. As of 1992, there were 32 registered farm composting operations. A significant portion of the wastes composted at these operations came from sources other than farms, such as food processors and paper manufacturers, while the end product has been used on farms and nurseries. It is estimated that the total quantity of agricultural and commercial organic wastes (not including leaf and yard waste) being

diverted to farm and nursery composting operations is approximately 180,000 tons per year.

Most of the growth in the amount of MSW diverted from disposal occurred as a result of the rapid expansion of residential curbside recycling and composting programs. Some of this increase is attributed to the Department having not surveyed the activity of over 200 private businesses recycling commercial waste within the Commonwealth before 1992. The primary categories and numbers of intermediate processing facilities in Massachusetts are shown in Table 3-2 (although categories overlap, none has been double counted).

Table 3-2: 1992 PROFILE OF PROCESSING FACILITIES IN MASSACHUSETTS

Category of Facility in MA	Total No of Facilities
Bottle Bill Material Processors	17
Waste Paper Baling Facilities	45
Public / Private MRFs	4
Scrap Metal Processors*	150
Plastic Processors(non-deposit)	2
Glass Cullenzers(non-deposit)	3
Mills using unprocessed recyclables	5
Municipal & Commercial Composting	12

* (not all handle MSW scrap)

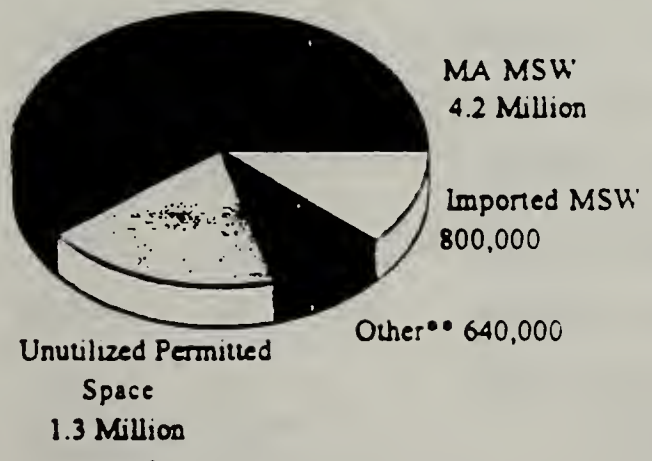
MSW COMBUSTION AND LANDFILLS

The Commonwealth has witnessed a significant drop in the spot market price for disposal of MSW at in-state facilities. In 1992, prices dropped to half the average 1988 rate, when tip fees were at their highest level. As a result of the relatively low cost, Massachusetts facilities imported approximately 800,000 tons of MSW in 1992, much of which came from Maine, New Hampshire, New York, and Rhode Island. Rhode Island data suggest that at least 300,000 tons of its MSW was disposed in Massachusetts in 1992. This imported tonnage amount was partially offset by approximately 400,000 tons of Massachusetts generated MSW having been exported, calculating to a net import of nearly 400,000 tons for 1992.

Figure 3-3 illustrates the uses of permitted solid waste disposal space in 1992. Note that this space includes the capacity of all facilities taking MSW, some of these facilities may also take non-MSW such as construction and demolition debris and waste water treatment plant sludge. Much of the unutilized capacity occurred at unlined landfills.

Over the past 15 years, combustion has played an increasing role in the management of solid waste in Massachusetts. Combustion reduces the volume of solid waste, thereby conserving landfill capacity, and also recovers the energy value of the waste, reducing reliance on other means of power generation.

Figure 3-3: 1992 ESTIMATED USES OF PERMITTED SOLID WASTE DISPOSAL SPACE*



* Permitted Disposal Space from Combustion facilities and Landfills taking MSW
** Other includes C&D, sludge and other difficult-to-manage wastes and recycling debris

In 1992, 3 million tons of MSW were combusted in nine facilities operating in Massachusetts. Of these facilities, six use mass burn technology that recaptures energy; two process refuse-derived fuel (RDF) before burning to recapture energy; and one, a municipal incinerator, neither processes RDF nor recaptures energy. Since publication of the 1990

Master Plan, one mass burn facility, SEMASS, has applied for a permit to construct and operate an expanded facility, increasing its permitted tonnage from 1800 to 2700 tons per day. A new facility in Shirley has also received its permit to construct, it will operate at 243 tons per day. As of January 1994, SEMASS had constructed its expanded facility and was testing it to ensure compliance with all relevant environmental standards. The SEMASS expansion and the Shirley facility are accounted for in disposal capacity projections. Table 3-3 lists the combustion facilities currently operating in Massachusetts.

Table 3-3: MASSACHUSETTS COMBUSTION FACILITIES*

Combustion Facility	Permitted TPD (1)	Tons Burned in 1992 (2)
Fall River	240	52,000
Haverhill - Ogden Martin	1,650	547,000
Lawrence - Ogden Martin	712	180,000
Millibury - Wheelabrator	1,500	520,000
N. Andover - NESWC	1,500	503,000
Pittsfield - VICON	240	78,000
Rochester - SEMASS	1,800	570,000
Saugus - RESCO	1,500	493,000
Springfield - SRRI	360	119,000
Totals(3)	9,502	3,062,000

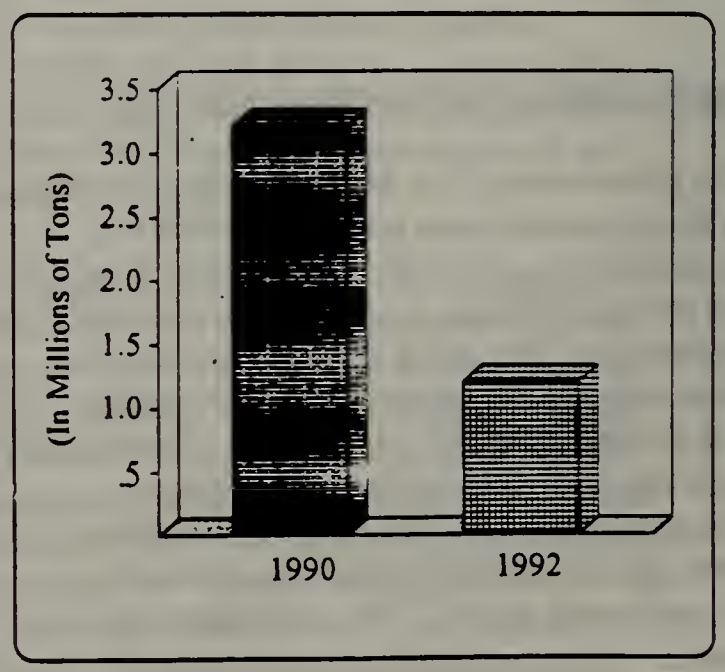
[Notes: * See Vol. II for more details. (1) TPD refers to tons per day. (2) MSW Burned accounts for estimated on line availability and metal recovery where applicable, except for Fall River, which is designed to operate at 52,000 tons burned annually. (3) Totals are rounded to the nearest thousand for tons burned]

Ash is a by-product of combusted MSW. In 1990, the Master Plan estimated that the State's combustion facilities generated 700,000 tpy of ash. In 1992, metal recovery operations after combustion reduced the actual amount of ash requiring disposal to 640,000 tpy.

DEP policy requires that MSW combustion facilities identify sufficient and acceptable landfill disposal capacity for bypass waste and ash. Ash is required to be monofilled in a dedicated lined landfill or portion of a landfill. Eight landfills are currently accepting ash from Massachusetts combustion facilities. The Odgen Martin Haverhill and Lawrence facilities share a disposal site adjacent to the Haverhill burn facility. Each of the State's other combustion facilities also have ash disposal sites located either adjacent or nearby. The NESWC combustion facility's long term ash disposal location in Peabody, is in the permitting process for an expansion. The Pittsfield combustion facility is currently landfilling its ash at an unlined site. The DEP is presently in enforcement proceedings to change this landfill's status.

The 1990 Master Plan projected that Massachusetts would have 99 landfills in operation by the end of 1992, instead of the 198 landfills in operation in 1990. Although the number of landfills operating since 1990 has decreased, there were still 122 active MSW landfills in operation by 1992. Even so, as Figure 3-5 shows, there has been a significant drop in the amount of MSW disposed of at landfills from 1990 to 1992.

Figure 3-5: MASSACHUSETTS MSW DISPOSED AT LANDFILLS FOR 1990 AND 1992



The 1990 Master Plan also estimated that, in 1992, of the MSW going to landfills, 60 percent would go to privately owned facilities. Reports now suggest that these facilities accept nearly 70 percent of landfilled waste, furthering movement away from the use of publicly owned landfills.

CHAPTER FOUR

DISPOSAL CAPACITY NEED ANALYSIS

The Commonwealth's solid waste policies and regulations, as well as technical and financial assistance programs, are designed to maximize waste diversion through source reduction, reuse, and recycling/composting. A central application of this integrated solid waste management approach, is DEP's review of disposal facility projects during the Massachusetts Environmental Policy Act (MEPA) process and the DEP permitting process. The purpose of this review is to determine if a proposed facility is needed to handle solid waste generated in Massachusetts. The agency's goal in reviewing facility proposals is to keep in-state demand for disposal capacity in balance with supply while meeting waste diversion and waste management hierarchy goals articulated in the 1990 Master Plan and again in this Update.

The criteria that DEP uses to analyze a project's compliance with integrated solid waste management objectives are found in the Solid Waste Site Assignment Regulations at 310 CMR 16.40(5)(a) and in the permitting section of Part 1 of the Solid Waste Management Facility Regulations at 310 CMR 19.038(2)(a)11-13. These criteria apply to all new facilities and facility expansions that are required to file an Environmental Impact Report (EIR) as part of the MEPA review. The site assignment regulations limit the review of potential projects to applications for landfill or combustion facilities.

The methodology by which DEP reviews proposed solid waste disposal projects has evolved over the past three years both in response to criticism by project proponents who have sought approval to construct a facility through either the MEPA review or DEP permitting process, and to continued improvement in the accuracy of DEP data and assumptions. In the course of having their projects reviewed, proponents and other interested parties have challenged the methodology by which the Department determines capacity need in several respects.

In the absence of a means to document the distribution of commercial waste to disposal facilities, DEP adopted the assumption that commercial waste generated in a city or town was disposed of at the same facility the municipality relied on for residential waste disposal. Disposal capacity project proponents contested this "same facility" assumption by asserting that it did not reflect the reality of commercial waste transportation and disposal practices. Furthermore, in some instances it was demonstrated that it could lead to a facility being allocated more tonnage than its permitted design capacity. The validity of the methodology was called into question, since this assumption was fundamental to the analysis of a facility's regional or service area disposal capacity need.

Secondly, project proponents argued that changes in the composition of MSW due to diverting recyclable and compostable materials would affect the ability of combustion facilities to operate at their design capacity. They contended that each ton of waste remaining after recycling and composting would have a higher heat producing content than the heating value for which the facility was designed. Consequently, combustion facilities would be unable to accept the same number of these hotter tons of waste without exceeding the design limits of the boilers and damaging their operation. Since these existing facilities.technically would be unable to operate at their permitted levels, it was suggested that additional disposal capacity would be required to address this decrease in effective capacity.

Proponents also asserted that commercial landfill capacity should not be totally allocated to accept 100 percent municipal solid waste since many commercial landfills also dispose of non-MSW

Table 4-1: ASSUMPTIONS UNDERLYING STATEWIDE ISWM CAPACITY ANALYSIS

1. Massachusetts will be neither a net importer nor exporter of solid waste

2. Residential and commercial MSW generation are predictable; residential MSW generation is a function of community size and commercial MSW generation is a function of the type of business and employment rates.

3. For capacity planning purposes, the total residential and commercial MSW generation through the year 2000 is 6.75 million tons.

4. Source reduction will offset changes in population and per-capita generation rate of residential MSW

5. By the year 2000, of gross MSW generated in the Commonwealth:
   a. Recycling (including composting) will divert 46 percent from disposal;
   b. 50 percent will be processed and burned by combustion facilities.
   c Four percent will be directly landfilled.

6. Diversion rates projected by the Solid Waste Master Plan will be met.
   a 1992 - 23%
   b.1996 - 34%
   c.2000 - 46%

7. Landfills will close when their current approved capacity is exhausted, unless closed earlier under order of the Department.

8. Existing combustion facilities will operate at full capacity, with on-line availability determined on a facility specific basis.

9. All contracts between municipalities and combustion facilities or regional landfills will remain in effect for the life of the contract.

10. The available capacity of commercial landfills is assumed to be equal to their daily permitted tonnage multiplied by the number of operating days per year, unless otherwise established in a permit or authorization.

11. The available capacity for the disposal of MSW at disposal facilities is reduced to account for the disposal of waste water treatment plant (WWTP) sludge (biosolids), construction and demolition waste, and other difficult-to-manage wastes in MSW landfills. The amount of displaced MSW capacity is equal to 10 percent of the total amount of MSW generated.

12. The available capacity of municipal landfills is assumed to be equal to the amount of residential waste generated in each municipality using the landfill minus the waste diverted by recycling unless otherwise noted.

Table 4-2: STANDARD METHODOLOGY TO DETERMINE STATE-WIDE NEED FOR SOLID WASTE DISPOSAL CAPACITY

Determination of state-wide capacity need uses the assumptions in Table 4-1 and follows the standard methodology outlined below:

1. Determine state-wide the amount of residential and commercial waste generated in goal years: 1992, 1996, 2000.

2. For each municipality, determine where residential waste is disposed and the expiration date of any long-term contract or closure date of the facility. Determine the expected life of each current disposal option using projected landfill closure dates as determined by the Department.

3. Compute the reduction in disposal need by subtracting the projected diversion due to recycling over time from the total MSW generated to obtain the balance needing disposal.

4. On a state-wide basis, determine the total disposal capacity available for each goal year for combustion capacity, municipal landfill capacity, and commercial landfill capacity.

5. Reduce available MSW disposal capacity by 10 percent of gross generation to account for the disposal of WWTP sludge (biosolids), C&D waste and other difficult-to-manage wastes.

6. On a state-wide basis, determine the sufficiency of future capacity by subtracting the total available disposal capacity from the balance needing disposal for each goal year.

waste, including construction and demolition debris and industrial waste water treatment biosolids.

To respond to these criticisms, DEP took several actions. First, it conducted an in-depth technical review of the scientific literature describing the effect of changes in waste heat value on combustion facility throughput. The agency also retained a consultant to conduct a study of the operations of Massachusetts combustion plants. This detailed analysis, presented in Volume Two, concludes, in part, that there has been no significant demonstrated effect of changes in the waste stream on the operations of Massachusetts combustion facilities, despite a significant increase in the recycling rate over the last four years. DEP has concluded from this review that, based on current data, predictions about future reduced combustion facility throughput cannot be used as a justification for the creation of additional disposal capacity. DEP will continue to monitor the effect of future changes in the waste heat value on throughput at these facilities so that, if warranted, it can appropriately adjust capacity needs projections

DEP has also modified some of the assumptions and the methodology by which it conducts the needs analysis. One of these revised assumptions acknowledges that some disposal facilities co-dispose MSW and non-MSW waste under the same permit tonnage limit, in essence, consuming some MSW disposal capacity. To address this reality within the methodology, one of the assumptions (Assumption 11 in Table 4-1) is revised so that the projected available MSW landfill disposal capacity will be reduced by 675,000 tons per year (tpy), an amount equal to 10 percent of the currently estimated total MSW generation.

There is a greater degree of uncertainty in projecting the actual volume of non-MSW disposed in Massachusetts landfills as compared to estimates for MSW disposal. This is partly because the largest component of that waste stream, construction and demolition debris (C&D), has a history of significant annual fluctuations based on construction starts and transportation infrastructure projects. Additionally, quantifying non-MSW is hindered by the absence of waste transportation or landfill reports that segregate waste inflow by types. A recent DEP survey of commercial landfills, however, reports that in 1992 approximately 400,000 tons of non-MSW waste was landfilled. Recycling of C&D waste is also a markedly increasing trend which is reducing the demand on landfill capacity. The most recent DEP data base survey identified twenty-five firms recycling in excess of one million tpy of building and roadway materials.

Having acknowledged the problems inherent in the current regional analysis, it was proposed in the draft of the Update, that only a state-wide disposal capacity analysis be conducted annually by DEP. The resulting capacity determination would provide the basis upon which a Request for Proposal ("RFP") for disposal projects would be conducted. Under this method DEP would select among competing disposal capacity projects. The RFP process was conceived by a subcommittee of DEP's Solid Waste Advisory Committee in an attempt to devise a project approval method that would be more cost effective and finite for proponents while promoting through competition innovative projects that advanced the State's goals. Although substituting an RFP process for the current "first over the permit line" approach to permitting disposal capacity has great potential to achieve those advantages, its implementation will be held in abeyance pending further study.

There are currently landfill expansion proposals representing nearly 2 million tons of annual disposal capacity proceeding through various stages of MEPA or DEP review in accordance with fixed regulatory timelines. Resolving the applicability of the RFP process to pending applications in which substantial amounts of money and time have already been invested, and

developing non-cost based selection criteria to differentiate among landfill expansion projects greatly complicates realizing the benefits offered in the RFP concept. Also, since the volume of expanded landfill capacity already under environmental review far exceeds the projected need for capacity through 2000, justification to accelerate regulatory reform to stimulate new disposal capacity development is absent. However, DEP may continue to evaluate the RFP process as a future method to allocate capacity among pending projects.

Deferring revisions to the project approval process and eliminating reliance on regional methodology in favor of a state-wide capacity limit resolves certain objections raised by solid waste industry representatives. It does not, however, address the concern expressed by municipal representatives that unique conditions may exist justifying a local landfill expansion even where there is sufficient state-wide capacity.

Allowance for a unique conditions exception recognizes that large scale commercial disposal capacity is not evenly distributed throughout the State. As a result, single community landfill operations may be substantially more cost effective when, for example, hauling costs are factored into a community's total solid waste management budget. Under this approach the service area analysis would no longer operate as a ceiling on the expansion of regional disposal capacity, but it would be available to proponents who wish to demonstrate that exceptional local conditions exist to justify expansion of single community operations. Even under these circumstances, the landfill must be part of an integrated approach which maximizes reduction and waste diversion and is consistent with the Commonwealth's long term goals.

The most appropriate venue for this type of alternatives analysis is the MEPA process, but currently DEP's solid waste regulations (310 CMR 19.038(3)) require a capacity need determination only if a categorical Environmental Impact Report (EIR) is required. Since the threshold for an EIR is 299 tons per day (301 CMR 11.25 (30)) and most municipalities assume responsibility to manage far less residential waste, DEP will propose to modify its regulations to require a capacity needs analysis for projects requiring the filing of an Environmental Notification Form (ENF) and accepting more than 99 tons per day (301 CMR 26(7)(f)2). Expansions that are not required to file an ENF are exempt from the capacity determination process.

The assumptions and methodology listed in Tables 4-1 and 4-2 are those that the DEP currently uses to determine state-wide need. The methodology described in Table 4-2 calculates state-wide need for disposal capacity by first estimating residential and commercial waste generation demand, then by reducing the projected demand based on the assumption that source reduction and waste diversion goals will be met and, finally, by allocating the remaining demand to existing permitted disposal capacity.

Figure 4-1 compares projected MSW supply and demand based on the assumptions in Table 4-1 for the years 1992, 1996, and 2000. The capacity projection depicted in Figure 4-1 is substantially different than that presented in the draft of the Update. The estimation of excess disposal capacity available in 1996 decreased slightly. This change reflects inclusion of the estimated capacity available at the active municipal landfills that were recently classified as potential threat or inadequate data to classify sites (See Chapter 5), as well as the adjustment in the estimated closure dates for two private landfills. The change in assumptions more accurately depicts the anticipated capacity status of these sites in 1996.

The second change in projected capacity status is the depiction of a possible need for approximately 500,000 tpy of disposal capacity in 2000 despite

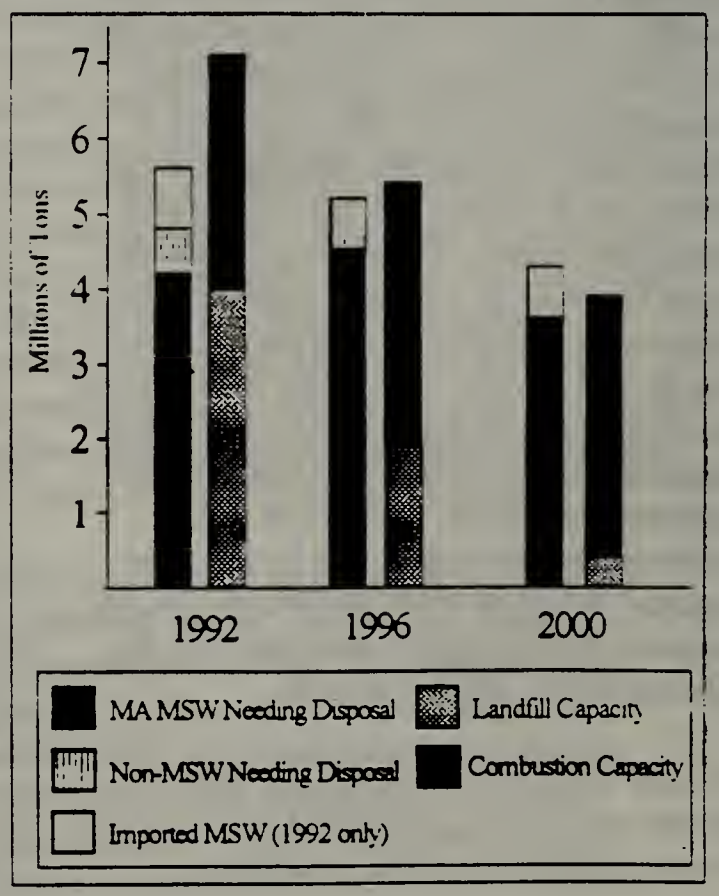
reaching the 46 percent waste diversion goal. This apparent need for disposal capacity is the result of reducing the available MSW capacity by 675,000 tpy to account for sites which also accept non-MSW and the expiration of existing capacity at landfills. This change from the draft Update is due to new information that the commercial landfill in Plainville (permitted at 2500 tons per day) will run out of currently permitted capacity by 1996, four years earlier than previously estimated. The change in estimated closure date of this facility dramatically affects the projection of state-wide need for disposal capacity given the current assumptions regarding generation and diversion rates and the depletion of MSW landfill capacity by co-disposal of non-MSW.

The likelihood of excess capacity being available in 1996 and the possibility of a shortfall in 2000 presents a challenge to meeting the Plan's purpose to maximize the opportunities for growth of waste diversion technologies while ensuring the availability of adequate in-state disposal capacity. Reconciling these potentially conflicting aims is complicated by landfill expansion projects now proceeding through the MEPA and DEP review processes As noted earlier, the nearly 2 million tons of disposal capacity represented by these projects would seriously exacerbate the 1996 excess and inundate the 2000 shortfall.

It is also important to note that the Plan had always assumed that 4 percent of the MSW generated (approximately 270,000 tpy) would not be amenable to recycling, composting or combustion (e.g. bulky waste) and would require landfilling. A significant portion of the shortfall reflects a need to restore that anticipated capacity and to account for the non-MSW co-disposal assumption not previously factored into the projections.
A solution is offered by the inherent flexibility of landfills to adjust their operations to different volumes and types of waste. Project proponents have identified some need to provide non-MSW disposal capacity for construction and demolition debris, processing residue, industrial sludge and other difficult to manage wastes. Since the Commonwealth has not established numerical waste diversion goals for non-MSW, DEP has approved expansions of landfill disposal capacity to manages these wastes without requiring a determination of the need for capacity.

Allowing disposal projects to proceed while restricting their intake to non-MSW, provides advantages to both project proponents and the Commonwealth. It allows the proponents to make a market based decision on whether to expand operations and compete for the non-MSW waste stream. Since several proponents claim DEP has substantially under-estimated the need for non-MSW capacity, the restriction should not undermine the viability of their expansion. These landfills could also provide buffer capacity to respond to contingencies such as clean ups from natural disasters, seasonal peak loads or unanticipated shutdowns of combustion facilities.

Figure 4-1: PROJECTIONS OF WASTE NEEDING DISPOSAL AT MSW CAPACITY



In addition to providing dedicated non-MSW capacity in the near term, this solution provides flexibility to efficiently adjust the availability of MSW capacity. If, for example, waste generation continues at a level below the 1990 projections, or recycling capacity increases beyond present projections, or non-MSW continues to deplete less MSW landfill capacity than now estimated, the shortfall may dissipate. Rather than committing to build MSW capacity six years in advance of a tentative need, this approach allows source reduction and waste diversion to expand beyond the constraints of our current assumptions. Conversely, if the relatively small shortfall is maintained there is disposal capacity in active reserve which can be converted to MSW use without requiring significant design or engineering changes at existing landfills.

CHAPTER FIVE

UNLINED LANDFILLS: ISSUES AND MANAGEMENT

In Massachusetts, it has been the practice of many communities to dispose of their solid wastes in municipally owned and operated landfills within their community. Generally, these landfills were sited in areas considered undevelopable, often in wetlands. As homes and businesses were constructed near landfills, so too were public and private water supplies. Today many of these older, poorly sited, unlined landfills present threats to public health and the environment.

THREATS POSED BY UNLINED LANDFILLS

In 1971, Massachusetts first promulgated regulations controlling the operation of landfills[3]. Since that time it has become increasingly obvious that unlined landfills pose a variety of environmental problems and risks to public health. Evidence to this effect has developed over the years based upon documentation both nationwide and locally through the gathering of monitoring data and through visual inspections of landfills. EPA, for example, has indicated that technical data does not reveal significant differences between the number of toxic constituents, and their concentrations, in the leachates of hazardous and solid waste landfill facilities.

Health and environmental risks from landfills can result from many exposure pathways. These pathways can include: a) drinking contaminated groundwater; b) inhalation of gases from waste decomposition containing toxic contaminants; c) exposure to vermin or other disease carrying organisms; or d) contact with contaminants by absorption through the skin.

Landfills form methane and other gases as solid waste decomposes. Methane can concentrate to explosive levels if allowed to collect in nearby buildings or utilities. Once methane exceeds the lower explosive limit (LEL), it presents an imminent hazard. There are several cases throughout the country, including a recent occurrence in Massachusetts, where landfill gas has migrated from landfills and caused explosions in nearby buildings. In addition, landfill gas typically contains other toxic materials which can cause health related problems.

The major source of the risks, however, stem primarily from the contamination of groundwater and surface water by leachate generation within the landfill as rainwater percolates down through solid waste, leaching or dissolving contaminants contained within the waste. Leachate may be discharged at the surface or edges of the landfill into surface waters or travel in groundwater as a pollutant plume. This plume may flow into the area around a drinking water supply well and be drawn into the wells by pumping. The plume may also reach other water bodies or water resources that then become contaminated. Once groundwater is polluted, it may be difficult and expensive to remediate.

This contamination is of particular concern in New England where groundwater levels are often close to surface elevations. Many people rely on ground water from public and private wells as their source of drinking water. Contaminants typically found in landfills include both inorganic metals and numerous organic compounds. Figure 5-1 lists the impacts on public health and the environment from Massachusetts unlined landfills according to a recent assessment of 105 sites.

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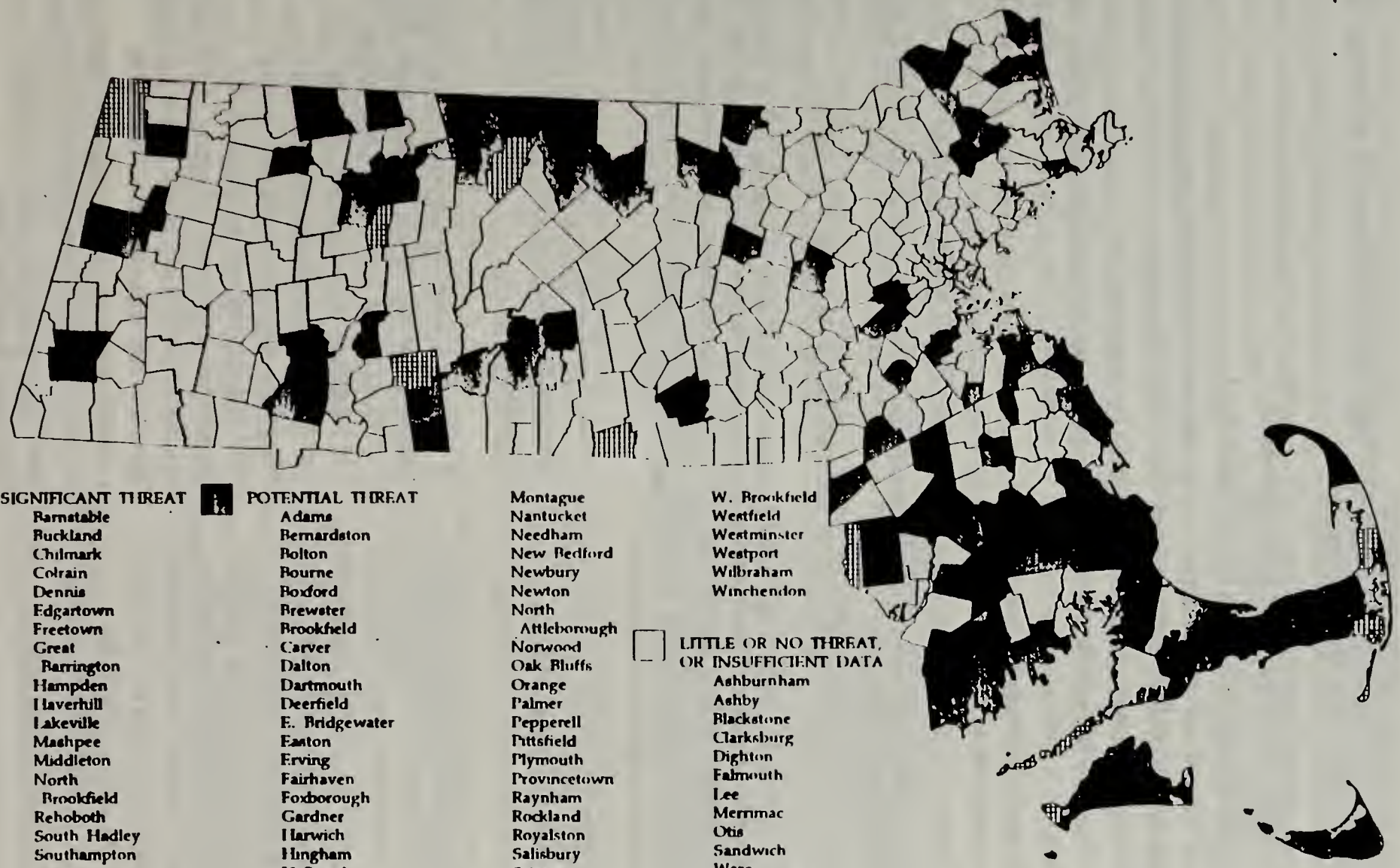
[3] These regulations did not require ground water protection systems, impermeable liners or leachate collection.

Figure 5-2: MASSACHUSETTS UNLINED LANDFILL CLASSIFICATION



SIGNIFICANT THREAT
- Barnstable
- Buckland
- Chilmark
- Colrain
- Dennis
- Edgartown
- Freetown
- Great Barrington
- Hampden
- Haverhill
- Lakeville
- Mashpee
- Middleton
- North Brookfield
- Rehoboth
- South Hadley
- Southampton
- Sutton
- Tisbury
- Topsfield.
- West Tisbury
- Yarmouth

POTENTIAL THREAT
- Adams
- Bernardston
- Bolton
- Bourne
- Boxford
- Brewster
- Brookfield
- Carver
- Dalton
- Dartmouth
- Deerfield
- E. Bridgewater
- Easton
- Erving
- Fairhaven
- Foxborough
- Gardner
- Harwich
- Hingham
- Holbrook
- Kingston
- Lunenburg
- Manchester
- Marshfield
- Mattapoisett
- Middleborough
- Milton
- Montague
- Nantucket
- Needham
- New Bedford
- Newbury
- Newton
- North Attleborough
- Norwood
- Oak Bluffs
- Orange
- Palmer
- Pepperell
- Pittsfield
- Plymouth
- Provincetown
- Raynham
- Rockland
- Royalston
- Salisbury
- Scituate
- Shirley
- Sudbury
- Taunton
- Templeton
- Truro
- Warren
- Warwick
- W. Brookfield
- Westfield
- Westminster
- Westport
- Wilbraham
- Winchendon

LITTLE OR NO THREAT, OR INSUFFICIENT DATA
- Ashburnham
- Ashby
- Blackstone
- Clarksburg
- Dighton
- Falmouth
- Lee
- Merrimac
- Otis
- Sandwich
- Ware
- Westhampton
- Williamsburg

MUNICIPALITIES VOLUNTARILY CLOSING LANDFILLS

DEP Division of Solid Waste Management

APRIL 15, 1994

Figure 5-1: IMPACT OF UNLINED LANDFILLS ON THE PUBLIC HEALTH, NATURAL RESOURCES AND THE ENVIRONMENT

DEP has preliminarily determined that the following environmental impacts could be attributed to the 105 unlined landfills initially assessed and classified.

- One public drinking water supply well was contaminated.
- Thirty six private drinking water wells were contaminated *
- Observable evidence of ecological damage to the environment (i.e. surface water discoloration or contamination, stressed or dead vegetation) was found at fourteen sites.
- Five landfills are located in the Zone II of public wells (recharge area).
- Five public wells have landfills located within the presumed recharge area (Interim Wellhead Protection Area).
- Two facilities are located within 1/2 mile up-gradient of a surface water supply with groundwater monitoring exceedances of Massachusetts Drinking Water standards or Guidelines (MDWSs).
- Nineteen landfills are located in areas designated as Potentially Productive Aquifers.
- Landfills gas was detected beyond the facility property line at eight landfills at concentrations that could pose a fire/explosion hazards.
- One fire was caused in a commercial building due to landfill gas migrating from the site.

* The 36 private wells contaminated do not include private wells that were abandoned due to proximity to landfills or proximity to monitoring or private wells with contamination. (For example, at one significant site 200 homes currently using private wells were required to hook up to town water. For an additional 200 homes with private wells it was made optional to hook up to town water). The Department does not have extensive data on the number of wells abandoned as a result of proximity to unlined landfills or proximity to contamination.

LEGISLATIVE AND REGULATORY ACTIONS

Evidence of the relation between unlined landfills and contamination of drinking water supplies led the Department to revise its regulations governing landfill operations. In 1990, the DEP incorporated performance and design standards for liners, final covers, ground water monitoring, and landfill assessments. In requiring all operating landfills to install liners and leachate collection systems, the regulations intended to prohibit unlined expansions and to compel unlined active areas to close within several years. In 1992, c.111, e.150A and 310CMR 19.000 (solid waste regulations) were amended to require unlined landfills to stop operating by the start of 1994 unless DEP allowed an exception.

In 1992, EPA issued revised solid waste landfill regulations, as required by Congress under Subtitle D of the Resource Conservation and Recovery Act. The Subtitle D regulations (40 CFR Part 258) regulations on liner design, groundwater monitoring, corrective action, and financial assurance requirements are similar to the Department's regulations. However, while both regulations prohibit any lateral expansion of landfill operations into an unlined area, the federal regulation avoids setting a mandatory closure date for unlined landfills except where a site poses a risk based upon its location relative to airports, floodplains or unstable areas.

The federal rules authorize EPA to designate state programs with the authority to regulate solid waste landfills where the state program would require operating permits for all solid waste landfills and where the program affords the equivalent public health and environmental safeguards as found in Subtitle D. Where a state program has been certified by EPA, the state program becomes the operative criteria for regulating landfills. Without certification, both state and federal rules would apply creating a confusing system of dual regulation. DEP has applied for certification of its program and approval is anticipated in the summer of 1994.

In response to legislative concerns that all unlined landfills should not be subject to immediate closure, the Administration and the Legislature enacted an amendment to the solid waste law. In place of a uniform mandatory closure date, the amendment created a public information and assessment process, instructing DEP to publish a list classifying unlined municipal landfills that expressed their intent to operate beyond 1993. Municipal unlined landfills would be classified based upon the level of threat to public health, safety and the environment: a significant threat, potential threat, little or no threat or insufficient data to classify the site. In addition, potential threat sites are required to install DEP approved groundwater monitoring wells by July 1, 1994. Insufficient data sites must install wells by January 1, 1995. Regardless of their status, all landfills must operate in full compliance with DEP solid waste regulations including, for example, the requirement to conduct corrective actions to prevent the migration of leachate in the event significant ground water contamination is detected in monitoring wells.

DEP developed classification criteria in coordination with a task force consisting of municipal officials, environmental professionals and interest groups. Significant threat landfills are those which present a higher risk to public and private drinking water sources or high explosion risk from landfill gas migration. Potential threat landfills may demonstrate existing ground water contamination that exceeds drinking water or ambient water quality standards. These sites are proximate to potential drinking water sources, or other significant natural resources. (See Volume Two for criteria background document).

The final classification list was released in April 1994 classifying the remaining 95 active unlined municipal landfills. (See Figure 5-2) Twenty two sites have been classified as a significant threat, 60 as a potential threat and 13 presently have inadequate data to classify.

Landfills that pose a significant threat to public health and safety or the environment are subject to unilateral enforcement action to close if DEP and the municipality are unable to negotiate a mutually acceptable closure date. DEP is conducting negotiation conferences with communities and anticipates that consent orders requiring accelerated closure of significant threat sites will be completed before the end of the year. At the same time, DEP will be conducting appropriate actions to ensure compliance with the statutory mandates for installation of monitoring wells. Sites that are not on an accelerated closure track will be subject to permit reviews and site assessments to ensure that on going operations are in full compliance with State regulations.

Under the recent amendments to the Massachusetts Contingency Plan regulations, promulgated under MG. c. 21E, landfills with groundwater contamination migrating beyond the site's boundaries are classified as hazardous waste sites.

LANDFILL ASSESSMENT

DEP requires that landfills be assessed prior to closure or any time significant contamination exists. The protocols that comprise the assessment

process are used to characterize a site as to its level and extent of contamination. The result of the assessment will determine the level of cleanup in addition to the capping requirement. Assessments are structured to minimize duplicating work, expedite reviews, establish and maintain complete site histories, and achieve regulatory compliance with all relevant DEP programs.

The DEP's three-step process involves compiling a site history, characterizing the subsurface, determining potential groundwater flow rates and pathways of contaminant migration, identifying potential sensitive receptors, and determining existing air, groundwater and surface water quality. Based upon the results of the assessment, the risk to public health and the environment can be evaluated. and the remedial measures required to be undertaken are identified.

Step one: the Initial Site Assessment (ISA) consists of a historical and literature review, an evaluation of existing data, the identification of sensitive receptors. and a site visit. The information gathered during this phase is used to develop a monitoring network required for the next phase.

Step two. the Comprehensive Site Assessment (CSA) is comprised of field investigations and report preparation. During the CSA. the data necessary to characterize the site's environmental impact are collected. recorded. and analyzed. The CSA consists of site mapping, drilling of monitoring wells, sampling and analysis of wells, surface water, and for landfill gas, data compilation and interpretation, and development of a qualitative risk analysis. Where the qualitative assessment indicates conditions exist that are a threat to public health or the environment, then a more rigorous quantitative assessment is required.

Step three: the Corrective Action Alternatives Analysis (CAAA) is an evaluation of viable options for remediating the landfill. In some cases, the CAAA aids in selection and design of additional closure measures necessary to abate significant environmental and public health risks. In other cases, the CAAA aids in the selection and design of technologies that can make up a lower-cost alternative to the standard closure while protecting public health and the environment.

COSTS OF CONTINUED OPERATION

Massachusetts communities that own and operate their own landfill face a significant financial burden when closing their landfill. Current regulatory standards require that all commercially owned landfills and publicly owned regional landfills have in place a financial assurance mechanism covering the full cost of closure of the landfill and the cost for post closure activities. By contrast, financial reserves covering these costs are rare among those communities with unlined municipal landfills and financial assurance mechanisms are non-existent. Typically, the annual costs for operating the municipal landfill are appropriated each year from the municipalities operating budget. These operating costs represent only a fraction of the true cost of waste disposal. The result is that financing the closure of the landfill means funding the cost of capping and post closure costs at the end of the landfills useful life. while at the same time the community is switching to a more expensive disposal option, one which reflects the total cost of providing disposal.

The DEP is addressing the issue of tight municipal budgets in at least two ways:

1. Proposed funding for facilities that will act as transfer stations for both solid waste and recyclables (see Chapter Two);

2. Coordination with the Massachusetts Highway Department to make clay available from the Central Artery project for municipalities to use as capping material.

In addition, over the past four years DEP has conducted numerous technical training sessions with municipal officials designed to familiarize them with regulatory requirements and improve the cost-effectiveness of their business relationships with contractors and consultants.

Delays in capping an unlined landfill are in many instances a very false economy. The longer unlined landfills remain uncapped, the higher the potential cleanup costs are from contamination migrating off-site. Restoring a damaged wetland, installing a ground water treatment system to clean up contaminated water supplies, or developing a new well for drinking water to replace one that has been contaminated are expenses which are additional to the cost of capping a landfill alone.

Capping landfills under the authority of solid waste laws and regulations is typically a less costly and more streamlined process than cleanups taken under the Commonwealth's C. 21E Waste Site Cleanup program or the Federal Superfund program. While under the Massachusetts Solid Waste Regulations closure may average $125,000 per acre in 1992, Superfund closures average four times that amount. For example, at one unlined landfill which was on the National Priority List (Superfund List) under Comprehensive Environmental Response, Compensation, and Liability Act of 1980, contamination resulted in the closing of the water supply for ninety-six (96) units of a condo complex. Additionally, one-hundred and sixteen (116) homes and twenty-four (24) apartment units were also affected. The total cost for a permanent water supply replacement system was nearly $4 million dollars. Capping of the site (over 60 acres) costs approximately $15 million not including ground water remediation costs.

In addition to the aforementioned site, a currently listed significant threat landfill contaminated the wells for eight condo buildings and twenty-two private wells. As a temporary measure the Environmental Protection Agency provided bottled water for residents to drink, cook and bathe. The groundwater contained organic solvents at concentrations exceeding the Drinking Water Standards for Chemicals in federal and state drinking waters. The maximum concentrations detected exceeded the federal standard by a factor of seven. The town had to pay over $900,000 dollars to provide an alternative water supply to the condo units and over 200 homes with private wells. Included in the 200 homes were not only wells with contamination, but homes with wells that would be at risk to future contamination emanating from the landfill. An additional one-hundred plus residents were given the option to hook up to the alternative public water supply if they so desired.

Today, fifty-five municipalities across the Commonwealth already face the prospect of implementing a federal Superfund remedy at landfills. These landfills are listed on CERCLIS, a national registry of potential Superfund cleanup sites.

CONCLUSION

While existing drinking water supplies demand immediate protection, the Commonwealth's water protection goals extend to future drinking supplies and sources that discharge into wetlands and surface waters. Closure of unlined landfills is a key element in this strategy, since their continued operation increases the likelihood and severity of leachate contamination to both ground and surface waters. Regardless of what immediate environmental monitoring results may show, communities should evaluate very carefully their exposure to increased operating and clean up costs when they are calculating the apparent short-term benefits of keeping their landfill open.

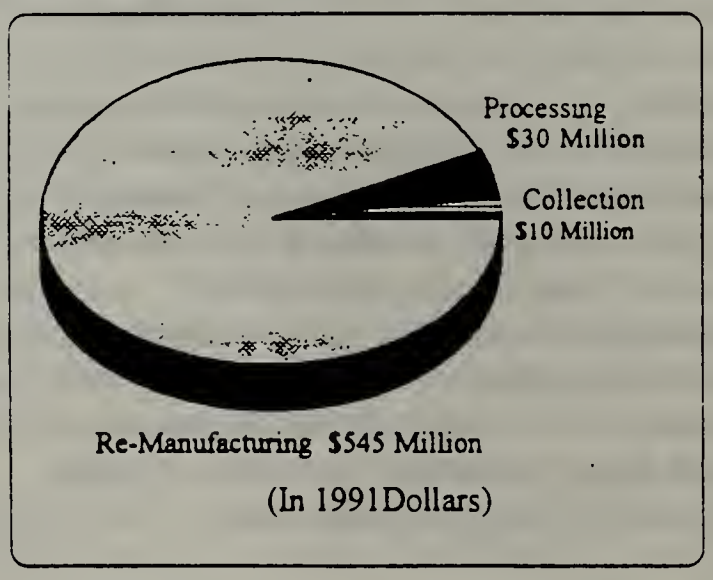
CHAPTER SIX

MARKET DEVELOPMENT FOR RECYCLING

To reduce the total cost and environmental impacts of landfilling and incineration, Massachusetts, along with the rest of the Northeastern states, has moved to make recycling a permanent and cost-effective component of integrated solid waste management. Critical to this is the existence of strong, stable markets for the materials diverted from the waste stream for recycling. Until a material separated from the trash for recycling ("secondary material") is processed and then re-manufactured into a marketable end-product, it hasn't truly been recycled.

Developing markets for recycling means taking actions that help increase manufacturers' use of secondary materials to make recycled products, so as to make recycling an economically sustainable component of integrated solid waste management. With recycling- related manufacturing estimated to add more than $600 million to the Massachusetts economy each year (see Figure 6-1), developing markets for recycling also represents an opportunity to use our solid waste to drive economic growth.

Figure 6-1: VALUE ADDED TO MASSACHUSETTS ECONOMY THROUGH RECYCLING IN 1991



To manufacturers, the dramatic increase in the volume of materials collected for recycling in recent years represents a new source of raw materials, frequently less costly to use than their virgin counterparts. Realizing those savings requires significant investments in new manufacturing technologies, processing equipment, and in development of a collection and transportation infrastructure.

State government stimulates these investments in three ways:

- by building confidence that recycling collection programs will deliver a steady supply of usable materials to manufacturers,
- by stimulating sufficient demand for the products made from these materials, and
- by providing direct assistance to businesses making these investments.

All three of these factors helped spur de-inking investments in the early 1990's which caused major changes in the market for old newspapers in Massachusetts. As the most commonly recycled household item, the price paid for old newspaper has a tremendous impact on the economics of municipal recycling programs. The price paid for a particular load of old newspaper depends on factors such as how large a quantity has been assembled and how well sorted it is; many municipalities had to pay wastepaper dealers to take their old newspaper in 1990. But trends have reversed By 1993, the Springfield MRF had experienced a ten fold-increase in the price it receives for old newspaper, and industry analysts expect old newspaper prices to continue to rise through at least the middle of the decade.

The increase in the price paid for old newspaper is due mainly to multi-million dollar investments in

de-inking equipment by the paper manufacturers who supply most of Massachusetts newsprint. While the specifics vary among the industries using each recyclable material, the evolution of the market for old newspapers serves as a useful illustration of successful recycling market development.

EVOLUTION OF THE MARKET: OLD NEWSPAPERS AS A CASE STUDY

Old newspapers recycled in Massachusetts have generally been used by local paperboard mills and made into items such as shoeboxes or gameboards, or they have been exported to countries in the Pacific Rim and Europe. In the late 1980s, as recycling programs expanded throughout the Northeast, the amount of old newspaper collected approximately doubled. With the supply of old newspaper greatly exceeding the capacity of local paperboard mills, and with wastepaper generally near the end of the line in competing for export cargo space, the price of old newspaper plummeted. For smaller recycling programs dependent on spot markets, this meant that it became both more difficult and expensive to recycle newspapers. The need to boost demand for old newspapers became critical to the economics of recycling.

Besides paperboard mills and export markets, there are a number of other innovative uses for old newspaper such as making molded pulp packaging, cellulose insulation, or animal bedding, but all of these represent small markets relative to the supply of old newspaper. To bring supply and demand in balance, recycling officials shifted focus to increasing the use of old newspapers to make new newspapers -- "closed loop recycling."

Significant economic barriers stood in the way of getting paper mills to substitute old newspapers for trees to make newsprint. Most paper mills supplying Massachusetts publishers are in Northern Maine and Canada, close to the forests. Besides the transportation costs involved in substituting old newspaper, ink must be removed from the old newspaper before its fibers can be used to make new paper. Adding a full line of de-inking equipment at a mill costs as much as $50 million. To make matters worse, the newsprint industry had undertaken a major modernization effort earlier in the 1980's, and demand for newsprint was declining as a reflection of the slowed northeastern economy.

Before investing millions in de-inking equipment, newsprint manufacturers and their financiers had to be confident that they would be able to reliably obtain sufficient quantities of old newspaper that would meet their specifications over the expected twenty year life of the equipment. With up to three years lead time between making the investment decision and bringing the equipment on line, newsprint manufacturers who have made de-inking investments explain that the critical factors which built their confidence that Massachusetts could meet their raw material needs were: 1) regulations, laws, and legislative proposals that require recycling; 2) a steady increase in collection programs that divert high quantities of paper, and; 3) the existence of processors capable of sorting the paper to the specifications needed.

Those considering multi-million dollar investments in de-inking equipment needed to consider not only whether there would be an adequate supply of wastepaper to feed their mills, but also whether there would be adequate demand for the recycled newsprint they could produce. Until 1990, there were only three mills in eastern North America making newsprint with recycled content. Newspaper publishers interested in recycled newsprint expressed concerns about the availability, cost, and quality of recycled newsprint.

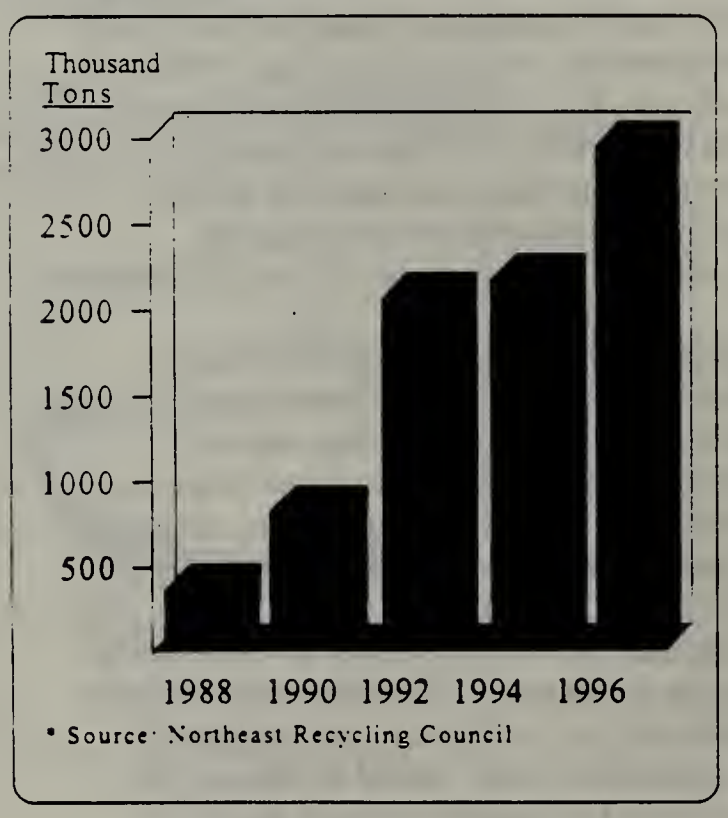
Despite these concerns, the Massachusetts Newspaper Publishers Association signed a Memorandum of Understanding with the Commonwealth in 1989, which was revised in 1992. In it, the newspaper publishers voluntarily agreed to boost the recycled content used in Massachusetts newspapers to 13 percent by 1993, 23 percent by 1995, 31 percent by 1997, and 40 percent by the year 2000, provided that recycled newsprint was available at a cost and quality comparable to virgin. Ahead of schedule, the publishers have rapidly increased their use of recycled content newsprint over the past three

years. The average recycled content of Massachusetts newspapers increased from 6.4 percent in 1991 to almost 15 percent in 1992 to 23 percent in 1993.

Similar supply and demand side measures throughout the Northeastern United States led to dramatic investment in de-inking equipment in the newsprint industry. Thirteen mills were producing recycled newsprint for publishers in the Northeast by the end of 1992, representing more than a five-fold increase in de-inking capacity since 1988 (see Figure 6-2). The increased competition for old newspaper has led to significant increases in the price paid for it to most municipalities, and more de-inking capacity is being added.

To make an appropriate return on their investment, newsprint manufacturers expect to run their equipment for a life of twenty to thirty years, ensuring steady demand in Massachusetts for years to come. Newsprint de-inking technology has also created demand for old magazines and incentives for local mills to accept a wider range of paper for recycling.

Figure 6-2: GROWTH IN NEWSPRINT DEINKING CAPACITY IN EASTERN NORTH AMERICA*



* Source: Northeast Recycling Council

Even though economics have dictated that these de-inking investments have taken place outside of Massachusetts, there are still positive benefits to the State's economy from these investments. Massachusetts based de-inking equipment manufacturers, engineering consultants, rail/truck depots, paper balers and processors, and haulers all benefit from the increased demand for old newspaper. At least one tissue mill in western Massachusetts has used its excess de-inking capacity to sell de-inked pulp to a Canadian newsprint manufacturer who hasn't invested in de-inking, and a number of firms are considering investments in de-inking pulp mills in Massachusetts.

ESTABLISH CONSISTENT AND RELIABLE SUPPLY

Concern for reliable, easy to obtain, high-quality supply of material is common to most manufacturers capable of utilizing recyclable materials as feedstock. For instance, the most common use for recycled glass is to remelt the glass and make it back into glass containers. Steady supply is important because the percentages of secondary glass that go into the furnaces can be gradually adjusted only over a number of months Steel containers' highest value use currently consists in shipping them to de-tinning mills close to steel mills in Ohio and Pennsylvania. For Massachusetts, the short-term key to strengthening markets for steel cans is to have sufficient quantities of old steel cans to ship to the de-tinning mills to justify a regular, economical, schedule of rail shipments.

The Commonwealth's most successful market development activities center on establishing Massachusetts as a consistent, reliable supplier of high quality secondary materials, to facilitate the transportation, processing, and manufacturing investments needed to make recycling economically sustainable. These include:

- Using regulations to motivate the diversion of secondary materials from the waste stream;

- Providing assistance to municipalities and businesses to develop recycling collection systems, and

- Supporting municipalities and businesses to enhance the State's processing infrastructure.

Regulations to Stimulate Diversion

Every manufacturer concerned about supply of recyclable materials inquires if Massachusetts has a law requiring the source separation of recyclable materials. In the absence of such a law, the Department included two provisions in the 1990 revision of its solid waste facility regulations aimed at motivating increasing flows of secondary materials.

The first provision requires all solid waste disposal facilities to work towards diverting 25 percent of the solid waste in their service area to recycling and composting. The regulations don't require the facilities to be the recyclers; rather, facilities may become active partners in the development of a sustainable recycling collection infrastructure For example, to comply with the 25 percent requirement, waste-to-energy facilities have sponsored workshops on commercial waste recycling.

The second provision restricts the disposal of recyclable materials at landfills and waste-to-energy plants on a phased-in schedule from the end of 1990 to the end of 1994. The timing of these rules provides significant lead time for material generators, as well as processors and disposal facility operators , and supports manufacturing and processing facilities moving ahead with investments needed to improve the economics of recycling. Partially in response to municipal financial concerns, the Commonwealth has created a process for municipalities to have their recycling programs approved and so avoid the need for facilities to inspect their loads to ensure compliance with the ban. There are over 300 communities who have applied for and received Department Approved Recycling Program (DARP) status. These communities are exempt from inspections at disposal facilities for bottles and cans.

Financial and Technical Assistance to Increase Collection

For those looking to invest in using secondary materials, the steady growth in the quantity of materials collected for recycling in Massachusetts is the strongest evidence that a reliable and sufficient supply will be there to fuel their investments. In Massachusetts, municipalities have traditionally assumed responsibility for residential solid waste collection and disposal, while the commercial waste stream is generally handled by each generator independently.

The Commonwealth assists municipalities in making the investments needed to start, expand, and improve recycling programs by providing grants for recycling collection equipment. This has helped fuel an increase in the number of municipal programs from 245 to 341 in just two years.

The Commonwealth provides extensive technical assistance to municipal recycling officials by providing workshops, written information, and advice on topics ranging from how to bid for recycling services, to public education to finding market outlets for their materials.

Commercial wastes account for approximately half of the Commonwealth's solid waste stream. The Department is now working with a group of businesses and non-profit organizations to develop a voluntary network to assist businesses both in minimizing and recycling their solid waste. The WasteCap program is modeled after similar programs in other New England states, where businesses take the lead in providing technical assistance to other businesses to minimize their wastes. In addition, the Massachusetts program will build on the successes of the Toxic Use Reduction program, which works with businesses to change operating processes to minimize the generation of toxic wastes.

Enhancing the Processing Infrastructure to Meet Manufacturers' Quality Needs

One of the most difficult aspects of newspaper remanufacturing is obtaining a relatively pure and consistent batch of secondary material. For example, the characteristics of wastepaper vary by where it is collected and how it is sorted. Paper mills can install a number of chemical or mechanical processes to remove contaminants, but investments in these processes are cost-effective only if the supply of wastepaper is consistent and dependable.

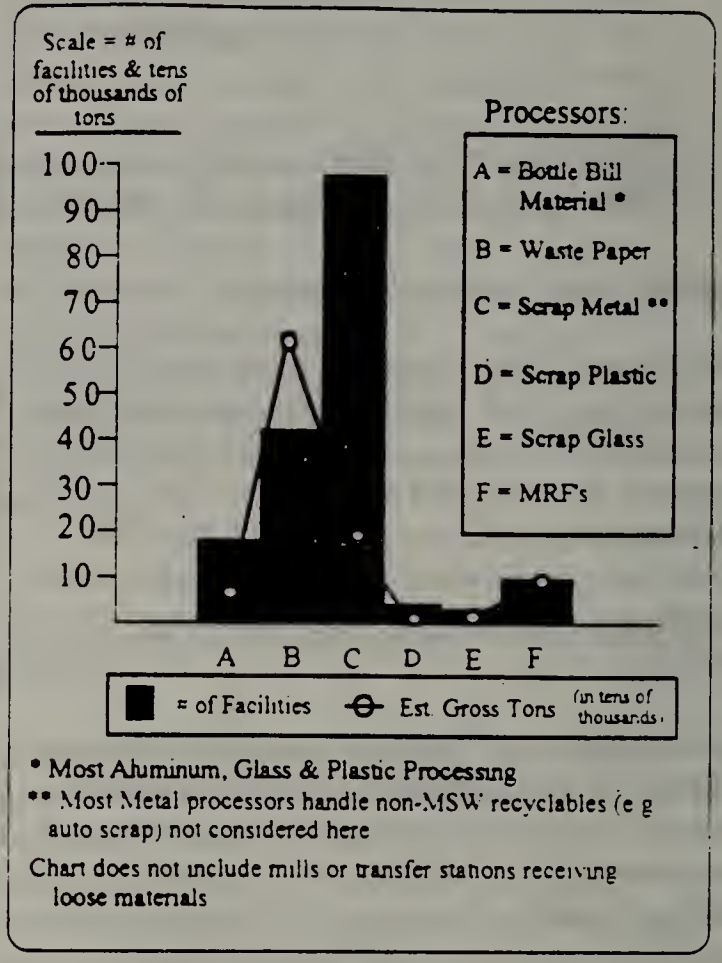
The same is true for the other industries that are capable of utilizing recyclable materials. Paper, plastic, glass, and metal manufacturers usually operate three shifts per day, seven days per week, and depend on large quantities of quality feedstock.

There are more than 300 processing operations in Massachusetts, which make recyclable materials more valuable to manufacturers. These firms range from paper baling operations and scrap metal dealers to deposit container processors who handle plastic, glass, and aluminum. These companies perform the following operations:

- Separate and sort recyclable materials into more valuable streams (i.e. glass is sorted by color, or corrugated cardboard is separated from other paper),
- Remove contaminants (i.e. labels or caps), and/or,
- Densify materials to make transportation more economical (i.e., by shredding tin cans).

As depicted in Figure 6-3, the bulk of the State's recyclable materials is processed by small firms specializing in a single material. To ensure quality for manufacturers, most of these firms collect their materials from commercial businesses or drop-off centers, or receive pre-sorted material and further process it.

Figure 6-3: RECYCLING FACILITY TYPES IN MASSACHUSETTS



* Most Aluminum, Glass & Plastic Processing

** Most Metal processors handle non-MSW recyclables (e g auto scrap) not considered here

Chart does not include mills or transfer stations receiving loose materials

Both MRFs and single material processors are critical to the State's recycling infrastructure. The first multi-materials MRF in Massachusetts was the state-owned, privately operated facility in Springfield that provides free recycling processing and marketing services to 99 western Massachusetts municipalities. The MRF aids recycling market development in Massachusetts by serving as an experimental center for collecting and processing new materials. In 1991, a pilot plastics and aseptic packaging (plastic coated paper, such as milk cartons) recycling program was started at the MRF, jointly funded by industry and the State. The program has since been expanded to 42 communities, supplying valued materials to plastics manufacturers for experimenting with new ways to utilize this expanded mix of plastics.

The Commonwealth also facilitates private investment in processing capacity. For example, modifications to the State's procurement law, passed by the legislature in 1992, removed

measures that had severely limited municipalities' and businesses' ability to negotiate recycling service contracts. At least three privately owned MRF's have opened since then. Smaller scale MRFs (which may only separate materials, rather than process them) are also under development at transfer stations and at single-material recycling facilities.

The Commonwealth has provided staff and consultants to large cities (such as Lowell and Boston) and to groups of municipalities throughout the State to aid in their efforts to contract for long-term processing services. These consortia play a pivotal role in either attracting private investment or in expanding the services offered by existing processors and waste collectors. For example, regional groups have initiated proposals for industrial "recycling parks" to draw several single-material processors to one location, to persuade a paper mill to develop a MRF collection point at its front end, and to establish transfer stations or "mini-MRFs" to send materials in bulk to larger mills or MRF facilities.

STIMULATE INCREASED RECYCLED PURCHASING

Increasing demand for products made with recycled content motivates manufacturer investments to increase use of recyclable materials. While an ever growing number of recycled products are equal to or better than the cost and performance of their virgin counterparts, many recycled products have not yet achieved an economy of scale in production. The State's strategies to increase demand for products made with recycled content are aimed at three different types of purchasers: government, businesses, and consumers.

Government Purchasing

Accounting for more than 10 percent of the Gross National Product, state and local government purchasing of recycled products is potentially a powerful market force for motivating manufacturing investments to utilize recyclable materials. As with other affirmative government procurement programs aimed at small and minority owned businesses, targeted purchases of recycled products by government can help create the critical mass necessary to make the purchase of recycled products more of a routine transaction for everyone.

A 1988 Executive Order (No. 279) directed the Massachusetts Department of Procurement of Goods and Services (DPGS) to purchase recycled products when such products of adequate quality are available at a reasonable cost. The DEP was directed to play an advisory role to DPGS. In the Spring of 1993, Governor Weld issued Executive Order No. 350, which directs State agencies to develop and implement environmental compliance and pollution prevention plans. The "Clean State" initiative has raised the profile of recycled purchasing throughout state government.

Recycled purchasing often initially requires higher transaction costs to modify specifications, to research availability and performance, and to educate users. The DEP's efforts to boost government recycled purchasing have focused primarily on educating purchasing officials about the need to buy recycled and on providing information to make it easier for them to do so. The Department's activities in this area include:

- Training purchasing staff in how to find out about recycled product availability and set recycled content standards;
- Sponsoring conferences, workshops, and meetings to bring together purchasing officials and recycled product vendors;
- Providing information directly to agencies such as the Massachusetts Highway Department about potential purchases such as rubberized asphalt; and
- Revising its own specifications for such purchases as plastic recycling containers and compost bins, to require that they be made with post-consumer materials generated or processed in Massachusetts.

State purchases of recycled products increased from $2.3 million in fiscal year 1992 to more than $4.2 million in fiscal year 1993. Steps under way to increase recycled purchasing through the Clean State initiative include hiring the first staff within the purchasing agency specifically dedicated to recycled purchasing, bidding more contracts solely for recycled products, and establishment of specific recycled purchasing goals.

Purchasing by Businesses

The Commonwealth's activities to boost recycled purchasing by businesses have focused primarily on large users of paper. Large businesses have been targeted because a small number of companies account for a great deal of purchasing. These businesses have dedicated purchasing staff who have the resources to adapt quickly to changes in their purchasing environment. Increasing recycled paper purchases is a top priority in market development because paper accounts for such a large portion of the recyclable waste stream.

Besides the agreement with the newspaper publishers, the Department played a lead role in negotiating a similar voluntary action plan on behalf of the Northeast Recycling Council with the Yellow Page Publishers Association, which commits telephone directory publishers to boost the recycled content of directory paper to 40 percent by 1998. Another Northeast Recycling Council initiative has led the Direct Marketing Association to challenge its membership to increase its use of recycled paper.

The Commonwealth has also sponsored workshops, produced educational materials, and worked with industry groups (such as the Boston Bar Association) to motivate corporate purchasing managers to increase purchases of recycled products and to learn about recycled product availability, performance, and cost.

In the Spring of 1993, the Governor challenged Massachusetts businesses to increase their use of post-consumer recycled packaging. In January of 1994, 33 companies were recognized for meeting this voluntary "packaging challenge" by using at least 25 percent post-consumer recycled materials in their packaging. Businesses will be recognized annually for reaching targets for recycled content in their packaging. (See box on next page)

Purchasing by Consumers

Clearly, the most powerful incentives for manufacturers to increase their use of recyclable materials, will be when most consumers include recycled content and recyclability among their buying criteria. Unfortunately, this may be the most difficult recycling-related innovation of the coming years, both because of the resources needed to initiate consumer education and because there is so much controversy over appropriate labeling standards. To date, most of the Department's efforts to increase recycled purchasing by consumers have focused on influencing the development of appropriate labeling standards at the national level. Controversy about appropriate labeling of recycled products centers on the level of recycled content necessary for something to be considered recycled, and on what is allowed to count as recycled content. Similar to issues of nutrition labeling, confusion may make consumers lose confidence in the meaning of product claims. The level of resources required to conduct an effective campaign also make it difficult to do broad consumer education.

In fiscal year 1994, DEP provided seed funding to the Environmental Defense Fund for public service advertising around a buy recycled theme; and the State will work with other partners in the future on similar public education campaigns.

PROVIDE ASSISTANCE TO CRITICAL INVESTMENTS

Economic benefits from recycling market development are maximized by supporting local industries that add the highest value possible to as much waste material as possible.

Investments critical to recycling market development in Massachusetts are not only in end-use manufacturing, but are also in other steps

of the value-adding chain, such as processing and transportation. The Department assists businesses considering investments that utilize recyclable materials by:

- Providing information on the development of the State's recycling infrastructure which will supply these businesses with their raw material;
- Making environmental permitting predictable and timely; and
- Helping economic development agencies understand the needs of these businesses.

Information on Secondary Material Supply

Any business that wants recyclable materials in its operations needs information on availability. The Commonwealth regularly provides firms considering recycling-related investments with information on quantities of materials collected; the State's current collectors, processors, and end-markets; and factors likely to influence future flows of recyclable materials. The Department led a 1992 Northeast Recycling Council project aimed at making recyclable material supply data more consistent across the Northeastern states and therefore more useful to businesses.

Making Permitting Predictable and Timely

The Commonwealth has taken steps in the past few years to shorten environmental permitting timelines and make it easier for businesses to comply with regulations. The solid waste facility regulations exempt most businesses that use recyclable materials as inputs for processing or manufacturing. Department staff meet with firms

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The Commonwealth of Massachusetts

Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

Press Release May 21, 1993

Governor William F. Weld today challenged all companies doing business in the Commonwealth to use significant and increasing amounts of post-consumer recycled material in the packaging of their products.

"Companies that step up to the plate and take the Challenge will commit to increasing their use of post-consumer recycled packaging," said the Governor. "This voluntary effort will help increase markets for recycled material, which is good for business, and good for the environment." Companies taking the Challenge agree to submit annual reports containing figures on the recycled content of their packaging.

Environmental Affairs Secretary Trudy Coxe said that "the challenge represents a way for businesses to voluntarily do their part in closing the loop for recycling, and for state government to recognize the efforts of those who do."

Both Governor Weld and Secretary Coxe praised the efforts of recycling committees across the State who have succeeded on the "supply side of the recycling equation in setting up recycling programs across the State."

"The most important task that remains," said Governor Weld, "is on the demand side of the equation, on buying products made from the recycled materials we divert from our trash."

Governor Weld will give merit awards annually to companies achieving the following targets: gold, use of at least 50 percent recycled content in at least half of all packaging generated by the business; silver, use of at least 35 percent recycled content in at least half of all packaging generated by the business; and bronze, for use of at least 25 percent recycled content in at least half of all packaging generated by the business.

considering recycling-related investments to assist them in understanding permitting requirements, and have expedited permits for recycling-related investments.

Sometimes, these permit applications do not seem to be related to recycling. For instance, the Town of Hubbardston 's landfill recently received Department approval to use sludge resulting from Erving Paper Mill's de-inking process as landfill cover material. Since the disposal of sludge is one of the key variables in the economics of de-inking projects, this approval is likely to improve the economic feasibility of other de-inking projects being considered in the State.

Coordination with Economic Development Agencies

Financial institutions often attribute higher risk to recycling-related projects, reflecting both the uncertainties in predicting the supply of recyclable materials and demand for recycled products in an evolving marketplace and the fact that many of the most promising recycling-related investments are considered by smaller or newer firms. This often makes it difficult for recycling-related businesses to secure adequate financing.

DEP's recycling market development staff work closely with the State's economic development agencies to help them understand the recycling collection and processing infrastructure and the needs of industries most likely to use secondary materials. The Department helps economic development agencies assist recycling-related businesses by:

- Referencing businesses interested in making recycling-related investments and advising businesses on how to get their assistance;
- Providing agencies with the results of market research on the needs of Massachusetts manufacturers using secondary materials. and barriers to greater use of such materials in the Northeast;
- Providing technical assistance on specific projects to enable the agencies to better understand the opportunities and risks posed by those projects; and
- Co-sponsoring workshops aimed at increasing communication among recycling-related businesses and the economic development community.

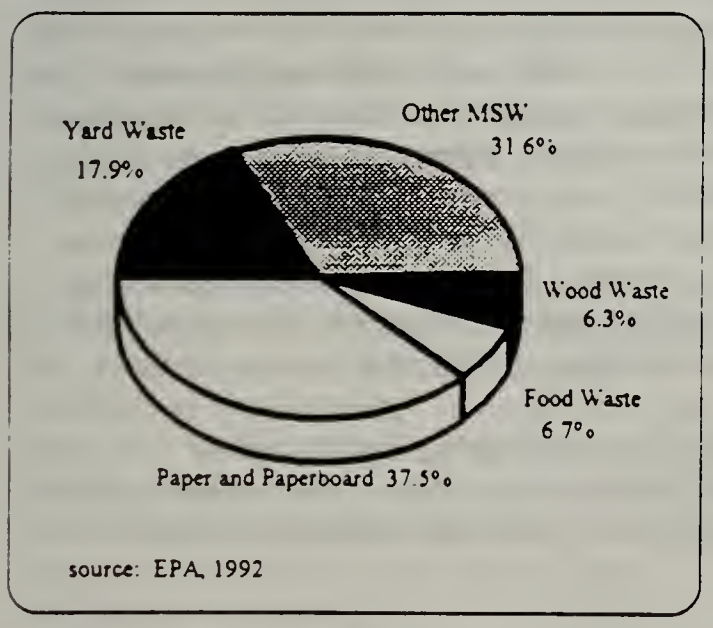
CHAPTER SEVEN

COMPOSTING IN THE 1990's

The Commonwealth strives to divert organic wastes from landfills and combustion facilities by converting them into beneficial products through composting or mulching. Typically the least costly of all waste management technologies, composting may account for nearly half of the State's municipal solid waste diversion by the year 2000.

Yard waste, leaves, wood, food, paper, and paperboard account for as much as 70 percent of total MSW by weight (see Figure 7-1). This percentage is even higher for agricultural and horticultural operations, and for many commercial and institutional establishments.

Figure 7-1: ORGANIC PORTION OF MSW BY WEIGHT



source: EPA, 1992

To achieve maximum diversion of organic wastes to beneficial use, the Commonwealth employs the following hierarchy:

1. Source reduce the quantity of organic wastes requiring collection and centralized processing through composting or mulching at the source of generation;

2. Facility compost source-separated organic wastes, starting with wastes that are easy to separate, collect, and process, such as yard waste, produce wastes, and manures, and expanding to include other residential and commercial organic wastes which cannot feasibly be recycled;

3. Facility separate and compost mixed residential and commercial organic wastes that cannot feasibly be source-separated from non-compostable or non-recyclable waste.

In keeping with this hierarchy, the Department's programmatic and regulatory strategies promote the following practices:

- Source reduce organic waste through home or commercial/institutional on-site composting of wastes (e.g., vegetative food and yard waste), mulching and leaving grass clippings on lawns.
- Compost yard and clean wood waste starting with centralized leaf composting, then adding grass and other yard waste and processing brush/tree waste for mulching or composting.
- Compost agricultural waste at farms and nurseries, along with yard and other clean source-separated commercial organic wastes.
- Compost source-separated commercial and institutional waste (i.e., food, produce and clean corrugated paper), as an addition to existing facilities (i.e., agricultural facilities) or at new composting operations.
- Compost source-separated municipal or residential organic waste, combined with source-separated institutional and commercial wastes.
- Compost facility separated mixed residential and commercial organic waste that cannot

feasibly be source-separated by employing extensive facility processing.

COMPOSTING AT THE SOURCE

Home composting is the most direct and least expensive way to recycle leaves and yard waste. Properly maintained, a home composting system can also handle other organic wastes, such as fruit and vegetable scraps, coffee grounds, egg shells, and paper products. Home composting can reduce household waste by as much as 50 percent by weight. Mulching and leaving grass clippings on lawns are other methods individuals can use to reduce organic wastes at home.

Since 1991, DEP has given 65 "Network of Home Composters" training workshops, attended by approximately 1,500 individuals. Three hundred workshop participants have volunteered to become Home Composting Coordinators, giving presentations promoting and providing information on home composting to their communities. To educate others, the Coordinators use workshop materials distributed by DEP along with a home composting video, "Turning Your Spoils to Soil." This video, produced through a collaborative effort with the Connecticut DEP, has been distributed to every public library in Massachusetts.

As a result of these and related volunteer efforts, at least 24 communities have initiated compost bin distribution programs. Several permanent bin demonstration sites have been established, and more are in the planning stages. See a description of the bin grant program in Figure 7-2.

Public education about home management of yard wastes has been expanded to promote "grass recycling"-- the practice of leaving grass clippings on the lawn rather than bagging them for disposal. DEP, in cooperation with the Connecticut Department of Environmental Protection and U.S. EPA Region 1, produced and distributed the following materials to each Massachusetts community in 1993:

- A "Don't Trash Grass" video program, which may used for presentations and local cablecasting;
- A prerecorded public service announcement that was sent to each radio station in Massachusetts;
- A "Don't Trash Grass" Community Action Handbook with step-by-step guidance on implementing a public education program;
- A master "Don't Trash Grass" pamphlet from which copies can be made, offering guidelines for lawn care that incorporate leaving grass clippings on the lawn.

Institutions, such as schools and restaurants, can use similar methods to significantly divert organic material from disposal. To facilitate on-site composting by institutions and businesses, the Department revised its Site Assignment Regulations for Solid Waste Facilities (310 CMR 16.00) to exempt such composting operations from permitting requirements effective July 1992. Small scale operations, composting less than one ton per week of on-site generated food waste, are exempt from State or local permits, if they meet minimum requirements. New compost facility regulations, scheduled to be promulgated by the end on 1994, may change qualifications for these exemptions.

In addition to regulatory exemptions, the Department is also assisting Massachusetts schools to establish on-site food composting programs.

LEAF AND YARD WASTE COMPOSTING

Leaves and yard waste constitute up to 18 percent of the State's municipal solid waste stream. These materials are typically separated at the source from other types of waste, making collection of compostable material a fairly simple procedure. A municipal composting program requires simple processing equipment and generally can be carried out with existing resources.

Figure 7-2: DEP's HOME COMPOSTING BIN GRANT PROGRAM

In 1993, the Department granted 3,400 compost bins to a pilot program conducted by the Southern Berkshire Solid Waste District on behalf of residents of Berkshire, Franklin, Hampshire, and Hampden Counties. Bins were sold at a discount and the revenues collected were used to purchase additional bins, resulting in a total distribution of 5,300 bins. The pilot bin distribution has been met with such enthusiasm by the public that DEP established a home composting bin grant program to make bin grants available to municipalities statewide in 1994.

This 1994 bin grant program will make home composting bins available to the residents of 107 communities in Massachusetts at discounted prices ($16-20). In accordance with the grant agreements, the grantee communities will distribute at least twice the number of bins received from DEP by using the revenue collected from bin sales to purchase additional bins. In addition, communities not receiving bin grants will be able to order bins under DEP's contract until April 1995.

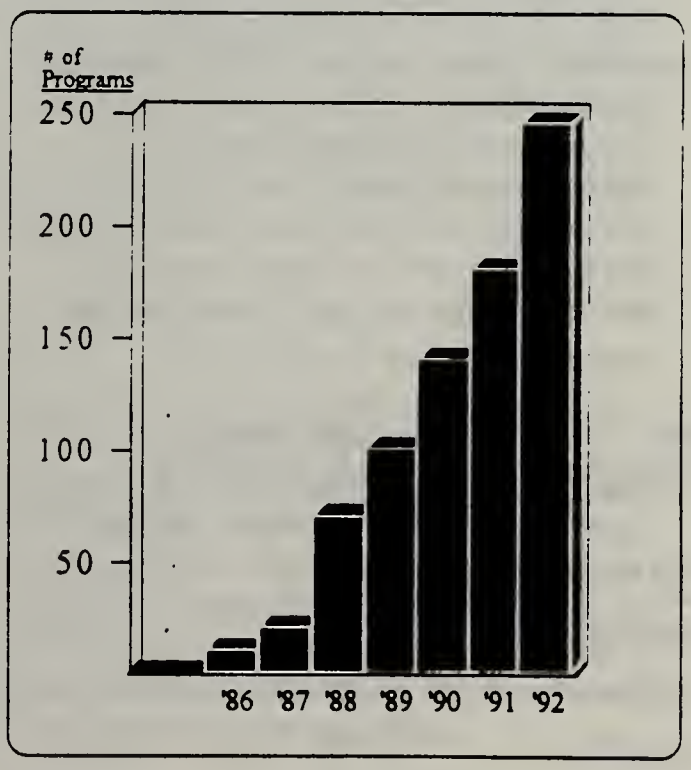
There are two types of bins available under the DEP contract, both contain at least 50 percent post-consumer recycled plastic generated or processed in Massachusetts. One of the bins (the Brave New Composter) was developed in response to DEP's specifications by a Massachusetts entrepreneur. It contains 100 percent post-consumer recycled plastic, and is being manufactured in Massachusetts.

Yard waste compost, an excellent growing medium, has many applications in municipal projects that require soil amendments and can save substantial expense through avoiding topsoil purchases. For municipalities in the process of closing and capping landfills, yard waste compost is excellent material for establishing the vegetative layer, reducing or eliminating the need to purchase thousands of yards of loam.

The Department assists communities in developing and expanding municipal leaf and yard waste composting. Since 1986, the Department has provided technical assistance, including regional training workshops, guidance materials, and on-site trouble shooting.

Today, municipal leaf and yard waste composting programs are established in almost 250 Massachusetts cities and town, using municipal or commercial sites, including agricultural facilities. Over one third of Massachusetts' leaf and yard waste is processed and composted at centralized operations. Most of the remaining communities require residents to divert their leaves and yard waste themselves. While state-wide diversion of leaves is largely successful, significant program expansion may be required by many municipalities to divert all other yard waste (grass clippings, prunings and brush). Figure 7-3 shows the success Massachusetts has had in increasing the number of yard waste composting programs.

Figure 7-3: GROWTH IN YARD WASTE COMPOSTING PROGRAMS, 1986 TO 1992



As of April 1, 1993, leaves, grass clippings, brush up to 1 inch in diameter, hedge clippings, and weeds are banned from disposal in Massachusetts

landfills and incinerators To aid communities in their efforts to meet the statewide yard waste diversion goals, the Department's composting program:

- Helps communities overcome such obstacles as siting and equipment limitations;
- Provides guidance on yard waste composting, including brush and green waste processing;
- Assists communities in public education;
- Assists development of regional and agricultural operations to provide additional composting options for municipalities;
- Encourages use of State-owned land for composting;
- Provides technical assistance on the incorporation of green yard waste into existing leaf composting operations, and,
- Increases composting of brush and clean wood waste through a yard waste processing equipment grant program The Department awarded four yard and wood waste shredders to four groups of municipalities, the host communities are listed in Table 7-1. These groups will share in the use and maintenance of the equipment, and will be able to process at least 40,000 tons per year for each shredder

Table 7-1: 1993 DEP YARD/WOOD WASTE PROCESSING EQUIPMENT GRANTS

Host Community	Communities Targeted	Population Targeted
Marblehead	19	425,000
Needham	20	850,000
Springfield	43	500,000
Worcester	11	300,000
Total	93	2,075,000

AGRICULTURAL COMPOSTING

The Commonwealth's strategy of identifying generators of organic waste materials and directing those materials to agricultural composting operations has expanded on-farm composting. Working in partnership with the Department of Food and Agriculture, DEP supports sustainable agricultural practices by limiting non-point pollution and enhancing economic activity.

Farms and other agricultural units often have the resources necessary for composting organic materials: land; equipment; labor, and; the capacity to use compost. Many organic materials in the waste stream can be incorporated into agricultural composting operations, such as yard waste, food wastes, mixed non-recyclable waste paper and commercial food processing wastes

The Commonwealth assists farmers in responding to local community concerns and in meeting State and local regulatory requirements. To streamline the regulatory process, modifications were made to the Commonwealth's Siting Regulations (310 CMR 16 05) that took effect in July 1992. Food processing and institutional food service waste were added to the list of materials allowed under agricultural composting exemptions. Farmers now simply register with the Department of Food and Agriculture.

There are currently 15 farms in Massachusetts that compost commercial organic wastes on a large scale and nearly 40 small farms that compost lesser quantities of non-farm organic wastes. These operations account for more than 100,000 tons of waste materials diverted from disposal while producing up to 200,000 cubic yards of organic soil amendment.

MUNICIPAL SOLID WASTE COMPOSTING

The Department recommends the collection and composting of source-separated municipal organic waste above facility separation of organics from MSW. Composting source separated organics will

facilitate the production and use of quality marketable compost and reduce potential adverse environmental impacts.

Large scale composting of either mixed solid waste or source-separated organic municipal waste (i.e., the combination of yard, wood, food, paper or paperboard wastes) has grown increasingly popular as a waste management strategy in the U.S. and abroad. The number of these facilities in the U.S. has doubled since 1990 to 21, most of which process and compost mixed municipal wastes.

There is growing interest in composting both source-separated commercial and residential organic waste. While numerous composting facilities now exist, currently only two or three full-scale facilities compost source separated residential organic waste. Nearly twenty-five pilot projects in the US and Canada have been initiated in recent years; one successfully diverted 70 percent of the waste from disposal.

Since 1986, the Commonwealth has helped several communities and regions evaluate municipal waste composting options. Commonwealth-funded feasibility studies for the Franklin County, Lowell and Northampton regions completed in 1991 and 1992, and for the Southern Berkshires in 1987, concluded that composting municipal wastes (either mixed or source-separated) is not only technically feasible, but with adequate markets in the region, economically feasible as well

Nantucket completed contract negotiations in 1993 with a private composting vendor for the construction of a 100 ton per day municipal waste composting facility. The facility will process and compost mixed and source-separated waste arriving at the facility, and an adjoining small material recovery facility will process source separated recyclables for market. The Department has recently issued a draft permit approval for this facility.

Several proposals for mixed and source-separated composting facilities have been introduced in Massachusetts. In order to establish such a facility in Massachusetts, three of the basic lessons learned elsewhere must be incorporated.

The *first* lesson is to target source-separated organic wastes. This can range from the collection of nearly all residential and commercial organic waste to the collection of just food, yard, and non-recycled paper waste to only food and yard waste. Targeting food and yard waste will likely result in a higher quality compost product and likely require less facility processing than if paper or other wastes are included. However, this latter option may result in less organic waste diversion. It should be noted that non-recycled paper, or paper that cannot be economically recycled, should be composted if the compost product can meet regulatory standards and can be marketed or utilized in a beneficial manner.

Second, facilities must be sited, designed, and managed to prevent significant environmental impacts and public nuisance conditions, such as odors. The potential impacts of facilities will depend both on the site location and buffer areas and the technologies and management practices employed. Regulations currently being developed by the Department will provide standards to ensure the safe siting, design, and operation of facilities. These will establish baseline requirements while allowing flexibility for the diverse nature of the technologies.

Third, the long-term viability of composting depends on sustainable beneficial use of compost. Concerns have been raised about the quality of mixed municipal waste composts and the environmental and public health impacts of their use. The primary quality concerns in marketing and using compost include chemical (e.g., heavy metals and toxic organics) and physical (e.g., plastic, and glass) contaminants. Achieving both public and market confidence in the benefits and safety of using compost is critical.

The development of viable markets for different types of compost is critical for the growing and continued success of diverting wastes through composting. The Commonwealth assists potential compost producers to identify markets and

marketing strategies, and is working to facilitate the procurement of suitable composts by State and local agencies.

Finally, the DEP is, along with reassessing current standards for the land application of sewage sludge products, including sludge compost, developing standards for the distribution, marketing, and land application of municipal waste compost. The Massachusetts standards for land application of sludge products (310 CMR 32.00) will be used as a basis for approving solid waste composts, until such time as the Department is able to provide new standards. Promulgation of new standards for both sludge and solid waste compost use is expected in 1995.

CHAPTER EIGHT

SOLID WASTE USER FEES

Most Massachusetts municipalities had, until recently, provided their residents with unlimited refuse management services. financed entirely through the local tax base. But increased costs of solid waste management are prompting reconsideration, and many communities are shifting toward user fee systems. The Department advocates the establishment of fee systems that incorporate both fixed and variable components to finance waste collection and disposal.

User fees that are unit-based provide the most equitable means of financing disposal. and by giving residents the direct financial incentive to accept responsibility for their own waste generation. we are more likely to achieve our goals, increase recycling and change purchasing habits.

A number of Massachusetts communities have had positive experiences with user fees, and the successes of fee programs nationwide. in communities such as Seattle, Washington, and Ilion. New York. are well documented. National studies show that user fees can influence citizens to reduce their waste and increase recycling and composting Findings of a recent World Resources Institute report reveal that implementing a unit-based user fee can typically lead to an 18 percent reduction in waste disposal and, when accompanied by curbside recycling, nearly a 30 percent reduction can be achieved.

Over 160 Massachusetts communities have initiated user fee programs to finance, at least in part. their solid waste programs. Fee programs for the management of solid waste are authorized in Massachusetts General Laws Chapter 44, Section 28C, Sub-section (f), which authorizes any city or town to fix, revise, charge, and collect such fees and other charges, for any facilities or services related to collection or disposal of solid waste.

User fee programs are successful when they are well planned and implemented, address a variety of waste types, are accompanied by an extensive community education program, are accurate in their accounting, include compliance/enforcement provisions, and are equitable. Successful programs must account for local solid waste circumstances and the particular concerns of the citizens. When introduced with convenient recycling, these programs can result in high rates of recycling and composting combined with reductions in waste disposal.

TYPES OF USER FEE SYSTEMS

There are several alternative user fee systems that can be considered by municipalities. In Massachusetts, user fee programs vary from annual flat rate charges to multi-tiered systems and experimental fee per pound of trash. A flat user fee structure is a user charge that is billed to each household periodically (monthly. quarterly. or annually). A flat fee is charged at a set rate regardless of the amount of trash collected. Approximately 115 Massachusetts communities have flat fee programs; these range in price from only several dollars per year to over $150 per year.

A unit-based user fee structure, also called variable rate or pay-per-bag, charges a fixed price for each unit of waste being disposed of by the customer. Thus, the larger volume user would pay more for larger volumes of trash, thereby encouraging source reduction and recycling. Some unit price systems provide reduced rates for elderly, low income households, and large families. Other programs charge a lower rate to households that participate in recycling and composting programs.

Approximately 55 communities currently have some type of volume-based or weight-based user fee, either for curbside or drop-off locations.

The more common user fee system options found in Massachusetts are described below. Some municipalities have combined aspects of one or more of these fee types:

- **Bags and Tags** -- Residents are required to purchase and use special bags, or purchase stickers or tags which are attached to trash containers. Collection staff pick up only the specially bagged or tagged items and containers.

- **Per Barrel** -- Residents use their own containers, and are charged a fee based on the number and size of barrels or cans they set out for trash collection each week.

- **Card Punch System** -- Residents without collection services purchase a special card This card is punched by the landfill or transfer station attendant based on the number of visits or number of bags brought for disposal.

- **Weight-Based Systems** -- Residents are charged based on the pounds of trash they disposed.

- **Sticker Fee** -- Residents must purchase a sticker for the use of the transfer station or landfill. Typically, stickers must be purchased annually, and may be combined with other fee structures, such as a per bag rate.

- **Flat Rate Fee** -- The community establishes a flat fee per household, and residents are billed periodically (monthly, semi-annually or annually). No adjustment is made for how little or how much waste is disposed.

Other systems for providing financial incentives have been used to encourage waste reduction and diversion. One common option is to charge residents less or nothing for recycling compared to trash disposal. While this method may feed the common misconception that recycling is "free", it can work to increase recycling. The Town of Webster currently charges residents $2.00 per bag at the municipal transfer station. The Town gives a $1.00 coupon as credit to residents who bring in a container of recyclables for future redemption on trash disposal at the transfer station. Residents who do not participate in the recycling program, or who bring in more than six bags for disposal, are charged $2.00 per bag. Other communities charge a unit price for waste disposal and collect recyclables at no charge. This approach also simplifies the fee system, although it may create revenue shortfalls if the town budget underestimates the amount of recycling.

SUCCESSFUL PROGRAM IMPLEMENTATION

Most Massachusetts communities with unit-based user fees overwhelmingly report positive experiences with their programs. Even so, presenting a user fee system or enterprise fund accounting system for community approval is an arduous and time-consuming process. Both systems require an extensive time commitment by the program advocates to educate the public, develop public support, and work the program through the political system.

A community contemplating unit pricing should focus its efforts on selecting the right type of program and gaining public acceptance as its top priorities. It is critical that in designing any system, the goals are clearly identified through a well outlined plan, the revenue and budgetary requirements carefully accounted for, and the support and involvement of a broad spectrum of local administrators and residents ardently cultivated. Each of these elements -- the plan, the budget and community support -- must be performed jointly, for the success of each is contingent on the others.

The Plan

One of the main tenets of user fees is to educate the public about the true costs of managing waste and to give each individual control over his or her own solid waste bill. A community may also wish to .

collect funds to cover the costs of landfill closure. Landfill closure is an excellent opportunity for a community to convert to a user fee program because costs need to be assessed and new disposal and hauling contracts made.

In determining the scope of services to be provided, the structure of the program, and the rate to be charged, it is important to consider local circumstances including history of services, political environment, and special constituents (low-income, seasonal, and transient residents). A successful program should include provisions for handling bulky and household hazardous wastes, as well as enforcement measures. A wide range of recycling and composting options should be offered in conjunction with disposal services. Educational materials explaining these services should also encourage waste reduction and diversion

The Budget

Before instituting any solid waste user fee program, a community needs to first determine the full cost of the current and planned system, identifying both the fixed and variable costs. Fixed costs are expenditures that do not change, no matter what the volume of MSW managed. They represent all costs associated with physical facilities (e.g., transfer station, drop-off center, landfill), minimum staff salaries, and vehicles. If the municipality operates a landfill, it may also include a reserve fund for future closure costs as a part of the total expenses Variable costs are those that fluctuate with the amount of waste. They include tipping fees, some transportation costs, and collection crew costs.

Using these costs in conjunction with the type of program selected will help to establish revenue requirements. Determining the actual fee rate requires that waste reduction and recycling incentives be balanced with the need to cover program costs. In many cases, the fees collected only cover a portion of the total costs, with the remainder being funded from general revenues. The more comprehensive the program (collection of MSW, recyclables, leaves, yard waste, household hazardous waste, and tires), the larger the user fee needs to be to support the program. Yet, the more comprehensive the program, the more successful it tends to be.

The Department advocates the adoption of two-tier user fee systems that cover the complete solid waste management costs--where variable costs are covered by the unit pricing system and fixed costs are covered by general revenues. Preferably, a community should set the unit-based fee to cover the variable costs of collection and disposal, fixed costs should then be funded separately, either out of the general fund or through a flat fee system. With a general fund subsidy, residents may not face the total cost of solid waste services, and so may not recycle to the greatest degree possible. However, charging a part of the program's costs, either through the tax base or a flat fee, reduces a resident's impulse to dump illegally since, they are already paying some amount for disposal and will want to get benefit for their money. In either case, however, the incentive for waste reduction is evident through the cost per bag or tag system -- the person producing more trash pays more than the person who produces less.

Flat fee programs, coupled with full-cost pricing and enterprise funds, have been an effective tool in managing many communities' solid waste budgets. However, unit-based fees have better potential to control solid waste costs because they provide an economic incentive to individuals to reduce waste and increase recycling. This important reward for changed behavior does not occur with flat fee programs.

With a one-tier system, the amount of revenue collected by a community will decrease as people reduce the amount of waste they set out for disposal. Depending on the community's cost for disposal and recycling, this may present a budgeting problem because, while some costs will decrease as the quantity of waste collected decreases (i.e., tipping fees at the disposal facility), fixed expenses will remain the same. In order for a community to continue to recover fixed costs, it will have to increase fees as people reduce the amount of solid waste they dispose of. Residents will not perceive any sort of "reward" for trying to reduce and recycle. This pricing structure therefore, does

not provide adequate incentives for reduction and diversion of waste, and may not provide the community with consistent revenues.

Accounting Systems

The Department also advocates the use of special revenue funds and Enterprise funds to track system revenue while also separating funds from the general municipal budget. These accounting alternatives have specific guidelines governed by Massachusetts laws, and each has distinct advantages and disadvantages to a community, depending on its financial and management policies and objectives.

Special revenue or revolving funds and enterprise funds allow communities to account separately for the expenditures and revenues of their solid waste, recycling and composting programs. They can help educate citizens and local administrators that solid waste management costs are a substantial drain on local budgets. Disposal habits effect the price of waste management and can ultimately constrain the community's ability to finance other general services.

A segregated accounting also provides enhanced information regarding the successes or needs of the program and facilitates rate setting and rate analyses. The key advantage of these systems is the ability to segregate revenues without otherwise altering the annual budgeting process. The main disadvantage is the need to establish and maintain a fixed assets accounting system.

Building Support

The Department realizes the difficulty in establishing user fee programs. Typically, in order for a program to achieve success, it needs to have broad community support during development of the plan, as well as prior to and throughout its implementation. Extensive public education campaigns and outreach must be performed. Many myths and problems commonly associated with user fees need to be addressed and can be mitigated through education efforts and negotiations with those to be most affected by the new system. Revealing the true costs of solid waste management and looking towards the State's many successful programs can assist in developing support and dispelling myths.

FIGURE 8-1: THE WORCESTER USER FEE PROGRAM

In November of 1993, the city of Worcester instituted one of the most successful user fee programs established in Massachusetts. Since the program's inception, Worcester has significantly reduced the amount of waste it disposes and has consistently achieved a recycling rate of 40 percent and a compliance rate of 99 percent. After almost six months of operation, the city has moved from a bi-weekly to a weekly pick up schedule for recyclables due to the high volume of materials collected.

Residents must set out their trash for collection in special 30-gallon bags which cost 50 cents each. Bags are available at over 100 area outlets. Special arrangements can be made for pick up of bulky items and the city organizes household hazardous waste drop off days.

Convenient recycling of a variety of materials (glass, metal, #1 and #2 plastic containers, newspapers, magazines, junk mail, and chip board) is offered free of charge. A drop off location for leaf and yard waste is also available.

Before the program began, educational materials explaining the program, collection schedules, and purchase outlets for bags, were distributed along with recycling bins. Public education continues with a 24-hour hotline number that guides callers through a voice mail system to answer questions in several languages. Worcester has also received a grant from the DEP for printing and mailing postcards and brochures to all households that update program details and reinforce non-acceptable items.

Researchers at Harvard University's John F. Kennedy School of Government have developed a report evaluating unit-based user fee programs in Massachusetts and identifying factors influencing program implementation and major obstacles faced. Their findings show that "issues traditionally considered major obstacles to implementing unit pricing for MSW services--multifamily housing, illegal dumping, and rate setting--have not proven to be major concerns." Instead, the most significant problems experienced by Massachusetts communities, according to the study, were customer confusion, selecting the right type of program, and resistance to the loss of "free" waste services.

The Department is committed to providing assistance to those communities considering instituting a user fee program. One of the most effective tools for choosing the right system is to review the experiences of other communities with user fee programs. The DEP is working to compile a report outlining a number of Massachusetts municipal user fee programs and Volume Two lists those communities with active programs. (See box on previous page for a description of the Worcester fee program.) These and other materials will be part of a technical assistance program offered to municipalities considering user fee systems. The Department will also develop better data to confirm the relative success of user fee programs on recycling and waste reduction. Despite mounting national evidence, such a study will be crucial to address the concern that the potential pitfalls of user fees outweigh the benefits.

CHAPTER NINE

DIFFICULT TO MANAGE WASTES

This Chapter presents a brief status report of waste management activities and policy direction in the areas of Construction and Demolition (C&D) waste, tires, sludge, and hazardous household wastes (HHW).

CONSTRUCTION AND DEMOLITION DEBRIS

Massachusetts defines C&D waste as debris generated from construction, renovation, repair, and demolition of roads, bridges and large building structure. The definition includes wood, steel, concrete, masonry, plaster, metal, and asphalt. The definition does not include wood from land-clearing, stumps, logs, brush, soil and rock from excavations. C&D waste is significant for both its small amount of hazardous materials such as asbestos, creosote, lead, arsenic, chromium, and formaldehyde resins, and its large share of the solid waste stream.

Waste generation figures for C&D are extremely difficult to determine. C&D waste covers a broad range of materials and activities that vary considerably over time and location. Demographics, the health of the local economy, and particular construction projects can all affect C&D generation. For instance, a large urban construction project may generate up to 1,000 tons per day of C&D. In 1990, the Department estimated C&D generation at 3.4 million tons, but with a slowing economy that estimate dropped to 2.4 million for 1991. Due to these factors, C&D generation estimates should be used with caution.

In Massachusetts, C&D waste is handled in three basic ways. It is disposed of at landfills or combustion facilities, processed for beneficial use, or transported out of state for disposal or processing. The Department's clearly preferred alternative for C&D handling is processing for beneficial use. Reusing C&D saves landfill space, provides legal alternatives for disposal, and conserves virgin materials. DEP intends to continue to track the C&D wastestream to improve the basis for predicting generation, recycling and disposal rates. The agency will also commence an analysis of this wastestream and its potential to be recycled in order to basis to establish planning goals for C&D source reduction and recycling.

The solid waste regulations at 310 CMR 16.00 encourage processing of C&D by exempting certain operations from site assignment. Asphalt batching plants that accept used asphalt are categorically exempt under 16.05 and facilities that accept and crush or process asphalt, brick and concrete (ABC) are also exempted under certain conditions. ABC operations must be located at an active quarry or sand and gravel pit where ABC rubble is pre-sorted, or a demolition-construction project where all ABC generated is processed on site. C&D must be processed to six inches or less in length, all rebar removed, recycled or disposed at an approved facility, and there is no speculative accumulation of rubble or rebar prior to or after crushing. Furthermore, C&D recycling operations, after a formal review process, may also be exempted from site assignment regulations (CMR16.05 (5)).

In order to evaluate the effect of the regulations and the status of C&D waste processing, the Department recently began a survey of C&D processing facilities. The on-going survey has contacted a variety of facilities including transfer stations, recycling operations, and exempt facilities. Preliminary results indicate that, in 1993, over one million tons of C&D were processed for reuse in Massachusetts by approximately twenty-five firms. Over half of the amount processed was asphalt, about one-third was concrete & brick, and the remainder was demolition wood and metals. When the survey is complete the Department will publish

a list of C&D facilities to assist contractors and other C&D generators find recycling outlets for their wastes.

The survey has thus far revealed that numerous beneficial uses for processed C&D are occurring in Massachusetts today. Untreated demolition wood is chipped and used as a compost bulking agent, or for landscaping and erosion control. Chips from painted or preserved wood are sold for boiler fuel. Rebar, steel beams, pipes, and other metal materials are removed from C&D and sold to scrap metal dealers. Asphalt batchers crush asphalt waste and mix it with new asphalt to produce Reused Asphalt Paving (RAP). Companies crushing and screening ABC materials supply aggregate for roadbase and production of new concrete. Some sand and gravel companies combine crushed ABC with virgin material for roadbase aggregate (See Figure 9-1).

To further develop the markets for some processed C&D waste, the Department has been working with the Massachusetts Highway Department to modify highway construction specifications to incorporate more C&D materials. DEP will continue to aggressively pursue opportunities to increase the use of products with recycled content in State and municipal transportation and construction projects.

Figure 9-1: BENEFICIAL USES FOR C&D

Material	Beneficial Use
Untreated Demolition Wood	Compost Bulking Agent, Landscaping, and Erosion Control
Treated Demolition Wood	Boiler Fuel
Metals	Scrap Metal
Asphalt	RAP (Reused Asphalt Pavement)
ABC	Aggregate for Roadbase, Production of New Concrete

TIRES

It is estimated that Massachusetts has 7.5 million tires stockpiled primarily at privately owned tire disposal sites. Annual generation of scrap tires is estimated at six million.

The Commonwealth restricts disposal of tires, by requiring shredding prior to disposal at landfills or MSW combustion facilities. The 1990 solid waste regulations provide a means by which recycling facilities can be established without the need for site assignment or permitting.

As a member of the seven state Northeast Waste Management Officials Association, (NEWMOA), Massachusetts participates in a regional EPA-supported project to develop a coordinated approach to tire management among the NEWMOA states. The NEWMOA scrap tire project has, to date, produced a thorough status report and analysis of the issue. A memorandum of understanding (MOU) was signed by each state in the summer of 1993. As part of this MOU, the members agreed to work together to develop model regulations and legislation.

Massachusetts faces a challenge familiar to all New England states: clean-up of existing piles and prevention of future piles. To that end, DEP is aggressively enforcing current regulations which prohibit stockpiling of tires. Additionally, DEP is supporting legislative actions which promote the reuse and recycling of scrap tires.

Finally, DEP is also working with the Massachusetts Highway Department to increase the amount of tire rubber used in asphalt pavement. The Highway Department is paving a test section of Interstate 93 in the Andover area this summer.

BIOSOLIDS

Massachusetts produces approximately 350,000 wet tons per year (70,000 dry tons at 20 percent solids) of wastewater treatment facility or POTW biosolids (sludge). Sludge is disposed by a variety of methods including sludge only landfills and

incinerators, co-disposal with MSW and composting alone or with MSW. The predominant methods are sludge incinerators and co-disposal in MSW landfills.

The large quantities of sludge currently being disposed of at MSW landfills are the result of the successful advancement of the Commonwealth's water pollution control efforts. But anticipated closure of many Massachusetts landfills will severely restrict this option. One method of disposal which the Department encourages as a replacement to landfilling is co-composting of sludge with the organic fraction of MSW. To encourage re-use rather than disposal the solid waste regulations require that the feasibility of alternatives to disposal of sludge in MSW landfills be examined prior to obtaining approval to disposal of this special waste.

The Department is currently drafting composting facility regulations which will establish design and operational requirements for composting facilities. These regulations will be completed in 1994. The second phase, development of compost end-use regulations. is scheduled for completion by mid-1995.

HOUSEHOLD HAZARDOUS WASTES

Over the past decade, the collection and disposal of household hazardous waste (HHW) has raised the public's awareness of the potential risks to human health and the environment posed by the manufacture, transportation, use, storage, and disposal of household products containing hazardous constituents. These collections, which were pioneered in Massachusetts, focused on the need for the safe disposal of HHW.

HHW one-day collections have a tremendous public education benefit, even for those people who do not actually bring their waste to a special collection. However, the high cost of such collections and the low capture rate of toxic materials makes this strategy inadequate. With costs of $50 to $100 per household, these programs, which now only serve between three and eight percent of a target population, are costly.

Even after a decade of HHW collections, however, people continue to purchase, use, and dispose of toxic household products in record numbers. Many household hazardous wastes collected for disposal have minimal impact on the disposal facility, the environment, or public health. Other, more toxic wastes (for which viable reuse and recycling options exist) are being disposed in the garbage or down the drain.

While the term HHW focuses on the disposal of wastes, a new term, hazardous household products (HHP), has been used to indicate that everyday products contain toxic materials which must be addressed through source reduction. Using the term HHP recognizes that a material only becomes a waste when it is disposed, and that many toxic materials should be examined with an eye toward removing the toxic components or promoting waste minimization.

Statewide Management Plan

In 1991, DEP staff and other interested persons developed a plan for managing HHW that included a focus on the hierarchy of waste management, starting with source reduction, reuse, and recycling, and moving to disposal of HHW down the drain and in the garbage where environmentally appropriate, prior to collection for disposal at a hazardous waste facility. The DEP plan looked at the risks posed by each product as a basis from which to make the management decision.

These 1991 recommendations will form the basis for a statewide HHW management plan that will outline the current and near future direction of the agency. Over the first six months of 1994, EOEA and DEP conducted six regional HHW meetings with experts across the State who are the key developers of HHW policy on the local and regional levels. These meetings formed the basis for the agency's first year plan, which received input from a focus group that was convened to provide input to the EOEA's Ten Point Recycling Plan.

New Direction

The agency has embarked on a new direction for the coming year with the help of funds from the Clean Environment Fund. Instead of encouraging the collection of all HHW for disposal, the agency will focus on those products with high toxicity, those with readily available reuse and recycling options, and those that show up often at HHW collections or are a large percentage of HHW. The focus will be on reduction, reuse, and recycling strategies for specific products.

In the first year, the DEP plans to focus on paint, used oil, and household batteries. Funds will be used for the following three items: (a) grants to municipalities to purchase paint sheds, so that municipalities can reuse and recycle their used paint; (b) grants to municipalities to develop "automotive recycling centers," which consist of a used oil collection tank, 55-gallon drums for antifreeze and oil filters, and a shed to cover these materials; and (c) research into policy and legislative options for used oil, paint, and household batteries.

In subsequent years, DEP will implement additional policies and programs that result from the research, as well as incorporating additional materials into its program for reuse, recycling, and waste reduction. Other wastes that deserve attention are fluorescent light bulbs, and products that are determined to pose technical or compliance problems for combustion facilities and landfills in Massachusetts.

What Wastes are "Hazardous?"

One of the first things that a HHW program must determine is which wastes should be collected for special disposal and which can be safely disposed down the drain and in the garbage. Such a distinction is needed so that a program can target the wastes it needs to collect to protect public health and the environment. By narrowing the focus, the program will become more cost-effective, as those products posing minimal risk are allowed to be disposed in solid waste facilities or wastewater treatment facilities.

The degree of risk posed by products depends on numerous factors, including the type and amount of the product requiring disposal and the type of disposal facility that would normally receive the waste. For example, some wastes acceptable for disposal in a wastewater treatment facility may be unacceptable in a septic system. Other wastes that are acceptable in a landfill may be unacceptable in a combustion facility, or vice versa.

Another related issue is the degree of additional environmental protection "purchased" by disposing of specially collected HHW in a hazardous waste landfill and incinerator as compared to a solid waste facility. Questions such as, "What happens to heavy metals, organic compounds, and other constituents in each disposal facility?" remain to be answered. The added environmental benefits will help us to determine whether the cost of disposing HHW in hazardous waste facilities is worth the added cost.

Developing Cost-effective Collection Programs

Once a program determines what is hazardous and needs to be collected for a given target population, it can decide how best to increase the participation rates so that these materials are actually collected. Some materials that can be reused and recycled may be brought back to several nearby collection locations. For example, several drop-off locations in a town may accept used oil and batteries. Other products, such as pesticides, may need to be collected at a one day event, permanent collection, or mobile collection program.

The DEP will develop program alternatives and provide technical assistance to local and county governments to assist them in developing their programs. The goal of the technical assistance will be to develop cost-effective programs that draw on the experience of other programs. Such assistance may include providing a model request for proposals for a hazardous waste hauler, encouraging bids designed to encourage competition, and identifying the wastes that need to

be collected, depending on the area's environment and disposal facilities.

Other cost-cutting measures may include allowing private companies to accept a town's HHW if it is the same type of wastes it also produces in its business. As a good will gesture, some companies are beginning to offer these low-cost disposal alternatives to communities. Other longer-term measures for regional collections may be the use of State or county property for the siting of collection events or permanent collection buildings.

Developing a Long-term Strategy with Product Manufacturers

While the short-term plan is to focus on reuse and recycling options for specific HHW, the most effective long-term strategy is to reduce the manufacture of products with hazardous constituents and instead to encourage the manufacture of less toxic and non-toxic products. Integrating work currently being developed by the State's Toxics Use Reduction program, along with the University of Lowell's Toxics Use Reduction Institute, the EOEA will begin to discuss source reduction and product modification with household product manufacturers. Key issues to explore include voluntary measures to encourage the switch from toxic product manufacture to non-toxic, how consumer behavior influences product choice, and the risks and benefits of common household products.

Integrating VSQG Waste with HHW

Another long-term goal of the agency is to integrate wastes from very small quantity generators (VSQGs), which have minor regulatory responsibilities, with wastes from households, which are exempt from both federal and state regulations. For many small businesses, waste management is very expensive. These businesses contribute to the risks posed by toxic products on health and the environment, and are perfect candidates for technical assistance. Such assistance can help reduce costs by combining wastes with the larger amounts that can be accumulated from households.

Sharing Information

The State is in a position to share information between and among local and regional HHW programs. RFPs, policies, and programs should not have to be reinvented. The DEP will work to increase local program access to State technical assistance through fact sheets, publications and, eventually, a telephone information line for citizen's questions on HHW. The DEP will also continue its yearly HHW forum, which brings people together to share program experiences, and will consider ways to obtain regular feedback on the State's development of its HHW management plan.

The following individuals have made significant contributions
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SOLID WASTE MASTER PLAN

1994 UPDATE

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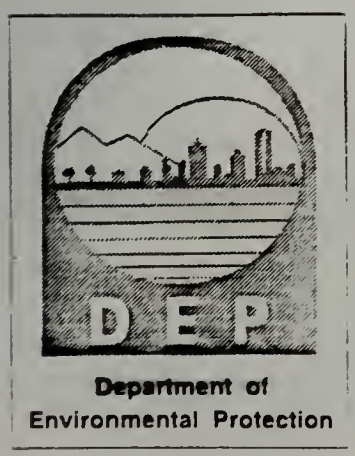

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Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection

William F. Weld
Governor
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Commissioner

CRITERIA FOR CLASSIFYING UNLINED LANDFILLS OCTOBER 14, 1993

CRITERIA FOR CLASSIFYING LANDFILLS AS SIGNIFICANT THREATS

This section describes the criteria for classifying landfills as a significant threat to public health, safety or the environment. Where applicable the criteria may include guidance on the additional information which the owner or operator may provide to the Department to reclassify the facility to a lower threat category. Definitions for terms used throughout this document are included in the back of the document.

1. Zone IIs

Landfills shall be classified as a significant threat when they are located within the Zone II of a public drinking water supply. Landfills may also be classified as a significant threat when a Zone II study has been initiated but not yet approved by the Department and where the study, or the Department's review of the study, indicates that the landfill, or a portion thereof, would be within the Zone II.

2. Interim Wellhead Protection Areas (IWPA)

Landfills located within an IWPA shall be classified as a significant threat.

Reclassification will be considered where new information demonstrates that the landfill cannot contribute to the contamination of the well because there is no hydraulic connection between the groundwater beneath the landfill and the public water supply well on the basis of the following:

a. the landfill is hydraulically downgradient of the public water supply well based on regional and/or local groundwater flow and gradient, and beyond the stagnation point. The determination of such a stagnation point shall be based on site-specific parameters and the highest daily approved pumping rate for the public water supply well; or

b. the landfill is cross-gradient (perpendicular) to regional and/or local groundwater flow direction and at sufficient distance from the public water supply well such that it is outside of the zone of contribution for the public water

supply well. The determination of such a zone of contribution shall be based on site-specific parameters and the highest daily approved pumping rate for the public water supply well; or

c. a hydraulic barrier exists between the landfill and the public water supply well.

3. Private Water Supply Wells

Landfills shall be classified as a significant threat where:

a. the landfill is located within 500 feet of a private water supply well; or

b. a private water supply well is located greater than 500 feet from the footprint of the landfill and either:

i. the private well has been sampled and data indicates exceedances of the Massachusetts Drinking Water Standards [MDWSs]; or

ii. groundwater monitoring establishes that MDWSs have been exceeded in any groundwater monitoring well at or beyond the point of compliance and contaminants associated with landfills are detected in the private well.

For landfills located within 500 feet of a private water supply well reclassification will be considered where new information demonstrates that the landfill cannot contribute to the contamination of the well because there is no hydraulic connection between the groundwater beneath the landfill and the private water supply well on the basis of the following:

a. the landfill is hydraulically downgradient of the private water supply well based on regional and/or local groundwater flow and gradient; or

b. the landfill is cross-gradient (perpendicular) to regional and/or local groundwater flow direction and at sufficient distance from the private water supply well such that it is outside of the zone of contribution for the private water supply well; or

c. a hydraulic barrier exists between the groundwater at the landfill and the private water supply well.

For any landfill with downgradient private water supply wells, reclassification will be considered when the landfill is not located within a Potentially Productive Aquifer and the following demonstrations can be made:

a. written documentation has been submitted to the Department demonstrating that the property(ies) served by the private water supply well has been connected to a public water supply system; and

b. written documentation has been submitted to the Department demonstrating the absence of any unpermitted cross-connection between the private water supply well and public water system or that the private well has been properly abandoned; and

c. written documentation has been submitted to the Department demonstrating that land use restrictions have been established by means acceptable to the Department, for the affected property(ies) prohibiting the use of the private water supply or the installation of new private water supplies and that such restrictions have been recorded and/or registered in the appropriate Land Court or Registry of Deeds.

4. Surface Drinking Water Supplies

Landfills shall be classified as a significant threat when:

a. the footprint of the landfill is less than one-half mile upgradient of a surface drinking water supply as defined by groundwater flow or surface water drainage and groundwater monitoring data indicate that Massachusetts Drinking Water Standards (MDWSs) have been exceeded in any groundwater water monitoring well at or beyond the point of compliance or there is documented evidence of the discharge of contaminants to the surface drinking water supply; or

b. the footprint of the landfill is less than 250 feet upgradient, as defined by groundwater flow or surface water drainage, of a perennial water course that drains to a surface drinking water supply which is within one mile of the footprint of the landfill and groundwater monitoring data indicates that the MDWSs have been exceeded in any groundwater water monitoring well at or beyond the point of compliance or there is documented evidence of the discharge of contaminants to the perennial water course.

Reclassification will be considered where new information demonstrates that there is no hydraulic connection between the groundwater beneath the landfill and the surface drinking water supply and that there is no drainage of surface water from the landfill to the surface drinking water supply.

5. Landfill Gas

Landfills shall be classified as a significant threat when concentrations of explosive gases exceeding 10% of the Lower Explosive Limit have been detected within any building, structure or underground utility, excluding any gas control or recovery system components or any leachate collection system components. (This situation is classified as an "Imminent Hazard" pursuant to the Massachusetts Contingency Plan, 310 CMR 40.0321).

6. Quantitative Risk Assessment

Landfills for which a quantitative risk assessment or analogous health study has been performed shall be classified as a significant threat where the quantitative risk assessment indicates that the landfill poses a Cumulative Cancer Risk Limit of an Excess Lifetime Cancer Risk of one-in-one hundred thousand (1 in 100,000),

or a Cumulative Non-cancer Risk Limit which is a Hazard Index equal to one.

7. Qualitative Risk Assessment

Landfills for which a qualitative risk assessment has been performed shall be classified as a significant threat where the qualitative risk assessment concludes that:

a. groundwater monitoring or surface water monitoring data indicates that the MDWSs have been exceeded at or beyond the point of compliance; and

b. there are identified pathways by which contaminants may move from the landfill to identified off-site human receptor(s).

CRITERIA FOR CLASSIFYING LANDFILLS AS POTENTIAL THREATS

This section describes the criteria for classifying landfills as a potential threat to public health, safety or the environment. Where applicable the criteria contain guidance on additional information the owner or operator may provide to the Department to reclassify the Department to a lower threat category.

1. Surface Drinking Water Supplies

Landfills shall be classified as a potential threat when:

a. the landfill footprint is less than one-half mile upgradient of a surface drinking water supply as defined by groundwater flow or surface water drainage; or

b. the landfill footprint is less than 250 feet upgradient, as defined by groundwater flow or surface water drainage, of a perennial water course that drains to a surface drinking water supply which is within one mile of the landfill footprint; or

c. a groundwater fate and transport model projects contamination of the surface drinking water supply.

2. 100 Year Floodplain

Landfills shall be classified as a potential threat when the landfill footprint is located within a 100 year floodplain.

3. Areas of Critical Environmental Concern (ACEC)

Landfills located within or adjacent to an ACEC shall be classified as a potential threat unless it has been adequately demonstrated that the landfill does not have an impact on the ACEC.

4. Exceedances of the Massachusetts Drinking Water Standards (MDWS)

Landfills shall be classified as a potential threat where ground water monitoring demonstrates that the Massachusetts Drinking Water Standards and Guidelines (MDWSs) have been exceeded at or beyond the point of compliance.

5. Potentially Productive Aquifers

Landfills located over Potentially Productive Aquifers where ground water monitoring demonstrates there is contamination above the level of contamination which is present in the aquifer upgradient of the landfill footprint [background groundwater quality] shall be classified as potential threats unless it is demonstrated that:

a. site-specific information on the types and/or transmissivity of soils shows that the groundwater is not located in a medium or high yield aquifer. This provision applies only to locations at or on the boundary of the

Potentially Productive Aquifer; or
b. the groundwater within the Potentially Productive Aquifer is naturally brackish, or has naturally occurring high levels of metals, such that the development of the aquifer as a public water supply is currently technologically or economically infeasible; or
c. the groundwater within the Potentially Productive Aquifer is sufficiently contaminated by sources, other than the landfill, such that the development of the aquifer as a public water supply is currently technologically or economically infeasible.

6. Wetlands

Landfills where the footprint is located within a wetland and where it is demonstrated that Massachusetts Drinking Water Standards have been exceeded at or beyond the point of compliance or Ambient Water Quality Standards have been exceeded in surface water shall be classified as a potential threat.

7. Surface Water Bodies Not Used for Drinking Water

Landfills where the footprint of the landfill is less than 250 feet upgradient of a lake or river (not including a stream) as defined in 310 CMR 10.00, other than a drinking water supply, and where Massachusetts Drinking Water Standards have been exceeded at or beyond the point of compliance or where Ambient Water Quality Criteria have been exceeded in the surface water body shall be classified as a potential threat.

8. Observable Evidence of Off-Site Ecological Damage or Location Adjacent to

Landfills adjacent to areas where there is observable evidence of off-site ecological damage such as vegetative stress, or where the landfill is adjacent to habitat for Rare, Endangered or Special Concern species or is adjacent to an Ecologically Significant Community or state Wildlife Management Area shall be classified as a potential threat. The Natural Heritage Program of the Division of Fisheries and Wildlife maintains lists for endangered species and ecologically significant communities.

9. Landfill Gas

Landfills shall be classified as potential threats where there are concentrations of explosive gases detected at the landfill property boundary at 25% of the Lower Explosive Limit or greater, excluding any gas control or recovery system components or any leachate collection system components, and there are structures or underground utilities within 1000 feet of the landfill footprint or where landfill gas is demonstrated to have migrated more than 1000 feet from the landfill footprint.

CRITERIA FOR CLASSIFYING LANDFILLS AS LITTLE OR NO PRESENT DISCERNIBLE THREAT OR LANDFILLS WHERE CURRENT DATA IS INCONCLUSIVE

1. Criteria for Classifying Landfills as Little or No Present Discernible Threat

Landfills shall be classified as representing little or no present discernible threat where data exists which demonstrates that the landfill does not fall into either the significant threat or potential threat categories.

2. Criteria for Determining That Current Data is Inconclusive

Landfills shall be classified as having insufficient data to be classified as a significant threat, a potential threat, or little or no threat when the Department determines:

a. there is too little data to classify the site;

b. the data that exists is of questionable validity. Data may be invalid for the following types of reasons:

i. the sample was taken from a groundwater monitoring well for which the Department has not received and/or approved as-built construction plans, boring logs and well locations;

ii. the sample was taken from a groundwater monitoring well constructed in a manner not approved by the Department;

iii. the analyses were performed by a laboratory other than a Massachusetts certified laboratory, unless the sample is accompanied by a complete Quality Assurance/Quality Control submittal; or

iv. the sample was not handled in accordance with the sampling and preservation requirements (e.g., sample container, holding time and sample volume) specified by the testing method.

c. there is no data for the site (no wells exist and/or no sampling has occurred) to clearly establish that a landfill is not contaminating groundwater or surface waters or emitting landfill gases and where the landfill also does not meet any of the locational criteria set forth in the Significant Threat category.

HIGHER HEATING VALUE

A DETAILED TECHNICAL ANALYSIS

In their 1991 Environmental Impact Reports (EIRs), two proponents of solid waste combustion facilities maintained that the 1990 Master Plan underestimated the future need for disposal capacity. This argument has since been made by other solid waste facility proponents. The central argument posed in both the East Bridgewater and Shirley combustion facilities EIRs was that the removal of certain recyclable materials from the municipal solid waste stream would cause a rise in the heating value of the solid waste fuel. As a result of this increase, existing waste-to-energy facilities would not be capable of burning the amount of solid waste for which they are permitted.

The project proponents estimated that the higher heating value (HHV) of solid waste burned by combustion facilities would increase by between 12 percent in the case of one EIR, and 19 percent in the case of the other, between 1990 and 2000.

Because of the implications of the HHV argument for capacity planning in Massachusetts, the Department determined in 1991 that it would carefully examine the HHV issue and began by placing a call for papers on this and other solid waste topics about which the Department sought assistance. The Department also hosted a conference on this issue, in February, 1992, in conjunction with the John F. Kennedy School of Government at Harvard University. The conference assembled experts with a range of opinions on this topic to discuss whether a changing waste stream would alter the need for solid waste management facilities.

The HHV issue raises two important questions which must be resolved. The first is whether or not the average HHV of solid waste will indeed increase over time and, if so, the magnitude of any such increase. The second question is whether existing combustion facilities will need to significantly decrease the amount of waste they burn as a result of any rise in HHV, and consequently the impact such a decrease would have on disposal capacity planning in Massachusetts.

Analysis of the Potential for an Increase in HHV: Background

Solid waste consists largely of combustible materials, although non-combustible materials, such as glass and metals, are also present. Each component (e.g., paper, plastics, tires, leaves and scrap metal) generates heat when combusted which is known as its Higher Heating Value, measured in Btu/lb. The HHV of various waste components has been determined by several authors in laboratory studies using bomb calorimeters. Values may vary from one study to another, although they generally approximate one another. The HHV of several typical components of solid waste are listed below (from Kaiser, 1977):

Table 1: HHV OF COMPONENTS OF SOLID WASTE

Material	HHV (Btu/lb)
Newspaper	6,223
Plastics	11,586
Wood	6,933
Food Waste	3,265
Glass	82

Few studies have examined the HHV of mixed MSW itself, but rather have determined the HHV of waste by calculating the weighted average contribution of each component based on an analysis of the composition of the waste. The HHV of mixed MSW samples have, however, been tested and determined by Sommer, et al (1988) and others. The HHV of commercial waste (7,463-7,991 Btu/lb) was found to be significantly higher than that of residential waste (6,271-6,775 Btu/lb).

The composition of solid waste, and consequently its HHV, is highly variable. Waste composition changes as packaging and purchasing patterns change. In general, the HHV of solid waste has been rising over the last 30 years due largely to the introduction of more plastics, which have a high HHV, into the waste stream. In 1990, the EPA projected that this trend would continue. The HHV of solid waste also varies seasonally, as well as from community to community, and from day to day. Seasonal effects are due largely to the disposal of yard waste in the Spring and Fall.

Variations in waste composition among towns often reflect different socioeconomic conditions or the varied types of businesses that may exist in one area and not another. Data indicate that there are considerable differences between waste composition from suburban locations and rural locations (Miller, 1992). A town with many restaurants may have considerably more paper and plastic in the waste stream than a town with heavy manufacturing, which may have more non-combustible metal in the waste.

Day-to-day variations can result from differences in moisture content, the schedule of deliveries to a facility from various sources, and the mix of residential versus commercial waste. One study (Mahoney, 1991) indicates that the most significant factor affecting HHV is moisture content, which varies from day to day and season to season.

The variability of solid waste make it difficult to determine, with any confidence, through modeling for any specific location, what the average HHV will be. This is particularly true when using generic, national waste composition data. Specific sampling and analysis of a wasteshed should increase confidence in composition analyses. Projections based on national studies are not likely represent the average HHV of waste in any particular locality.

Effect of the Diversion of Recyclables

Depending on the mix of recyclable and compostable materials removed, the HHV of post-recycling waste may increase or decrease. If non-combustables are removed the HHV of the remaining waste will increase. If combustables are removed the HHV of the remaining waste will decrease. Experts disagree on whether, and how much, HHV will rise with increased recycling. For example, the 1991 East Bridgewater EIR projected a 19 percent increase in HHV, while an unrelated 1991 study (Murphy, 1991) projected a 2.06 percent increase in HHV based on a recycling rate of 30 percent for Florida solid waste.

Table 2: PROJECTIONS OF HHV IN MASSACHUSETTS FROM VARIOUS SOURCES FOR 1990 AND 2000

Source	1990 HHV	Project 2000 HHV
E.Bridgewater EIR	4,961	5,882
Shirley EIR	4,961	5,533
Hopcroft	4,373	4,028
Hasselris	5,000	4778 (50% recycle)
SEMASS (for processed fuel)	5,200	Little change Range=4800-6000

Those who argue that HHV will rise significantly by the year 2000 make the following assumptions:

- The composition of solid waste in Massachusetts can be predicted by the EPA report entitled "Characterization of Municipal Solid Waste in the United States, 1990 Update;"
- The waste composition for 1990 presented in the EPA/Franklin report represents the base case without any prior diversion of recyclables; and
- The diversion rates and total tonnages of recyclables and compostables removed from solid waste will be those presented in the Master Plan.

However, DEP questions the extent to which recycling will affect HHV and the operation of combustion facilities. The first assumption may or may not hold true for any particular locality. EPA's report suggests, but does not reflect, actual

waste composition. For example, several waste components that are included in the EPA report may not be found to any great extent at a waste combustion facility. Tires (high HHV) and white goods (low HHV) are generally considered unacceptable waste at Massachusetts solid waste combustion facilities. The EPA report may significantly overestimate the contribution of tires and white goods to average HHV. Some materials, however, may be underestimated when compared to national averages. Without undertaking a specific sampling and analysis of solid waste composition in Massachusetts, there is no way of knowing whether or not the EPA report represents a reasonable approximation for any particular wasteshed.

National studies cannot accurately predict a base case waste composition for Massachusetts to provide a reference point for comparison to see the effects of recycling over time. Without being able to compare the current situation with a base year, there is no way to know the extent of any changes to HHV that may have already occurred. Some Massachusetts communities have recycled for a number of years while others have only recently begun. The Massachusetts bottle bill has diverted a significant percentage of both high Btu plastics and low Btu glass from the solid waste stream since its enactment in 1983. At the same time, the bottle bill has resulted in the replacement of low HHV glass containers by high HHV plastic containers. It is assumed that the redemption rate for plastic, glass, and aluminum containers is between 75-85 percent in Massachusetts as a result of this law. Together, the two factors above suggest that the waste stream in certain communities may vary significantly from the generic waste stream derived from using national waste composition data.

While there is little available historical information on HHV of solid waste, combustion facilities can determine the HHV of solid waste by using their boilers as a calorimeter. HHV has been determined in this manner at several facilities in the State (E. Bridgewater EIR, 1991). Table 3 contains a breakdown of HHV results for three Massachusetts facilities, with additional data from the SEMASS facility in Rochester.

Table 3: HHV FACILITY DATA

Facility	Average HHV
A	5253 (monthly, for 12 months, 1990)
B	5155 (monthly, for 12 months, 1990)
C	5774 (5 days, April 1988)
SEMASS	4950 (July, 1991)
SEMASS	5411-5735 (Acceptance tests, 1989)

These data, while unverified, may represent a reasonable base case for the communities' municipal solid waste currently handled by these facilities. The HHV determined by Facility C is significantly higher than those values for Facilities A and B, but no explanation for this difference was given. Because it is likely some of the communities sending waste to these facilities have recycling programs, the numbers do not represent a true base case. However, they may still provide useful data for future comparisons. It should also be noted that SEMASS data is based upon their use of Processed Refuse Fuel (PRF), from which some ferrous materials are removed prior to burning. More recent data from a survey of Massachusetts facilities (Goldman, 1994) indicates that the HHV of waste in 1992 to be between 5100 Btu/lb and 5300 Btu/lb for three facilities (Springfield, Millbury and Saugus).

The third assumption stated earlier may be reasonable, given the lack of better information on actual diversion rates and tonnages of recyclables collected. DEP cannot predict the exact mix of recyclables that will be diverted from the waste stream but, as recycling progresses, DEP will develop better analyses of what, and how much, of each material is being diverted.

Many in the solid waste management industry rely on the historical trend of an increasing proportion of plastics in the waste stream as a basis for asserting that there has been, and will be, a related increase in HHV. However, several things could dampen that increase. One would be passage of policies or the establishment of programs that would decrease packaging materials in the disposal stream (through accelerated source reduction and recycling). A second would be increased diversion of recyclables and compostables, which could

significantly alter the HHV of the resulting non-recyclable portion of the waste. Past recycling has focused on removing non-combustibles such as glass, tin cans, and other metals, as well as newspaper. Future efforts will focus more on the removal of office paper and plastics. For example, DEP is currently developing guidance to address the disposal ban on certain paper and plastics which goes into effect in 1995. The removal of both non-combustible waste with low HHV and combustibles with a high HHV could cancel each other out, resulting in an HHV for the remaining solid waste that changes very little from present levels.

Analysis of the Effect of HHV on Combustion Facility Operations

To properly design a solid waste combustion facility boiler, one must either make assumptions about the Higher Heating Value of the waste that the facility will use as a fuel or undertake a waste composition study of representative waste. Boilers are designed for a maximum heat input, generally expressed in millions of Btu/Hour. This ensures that boilers are not harmed by the combustion of solid waste and are capable of meeting air emissions standards. If the average HHV of solid waste is known, the tonnage of waste of that facility can be determined for a given time period.

Heat Input Rate = lb./hr burned
HHV of Waste

lb./hr burned x 24 hours = Tons Burned/Day
2000 lb/ton

Thus, if the HHV of solid waste increases by a significant amount, the facility must burn less waste. If, for example, waste has an HHV of 4000 Btu/lb, a facility with a heat input rate of 650 million Btu/hr can theoretically burn 1950 tons/day. If the HHV of waste increases to 5000 Btu/lb, the same facility can theoretically burn only 1560 tons/day, or 20 percent less waste.

The heat input rate to the boilers is also used to determine the permitted air emissions from the facility. Continuous Emissions Monitoring Systems (CEMS), used to monitor the emissions of certain pollutants, are calibrated from the average HHV of the fuel burned. If the HHV of the fuel changes, the allowable emissions from the facility changes. This relationship is the reason for specifying a maximum heat release value and HHV in a facility air permit. A study has indicated that, based on this relationship and looking at allowable emissions, an increase in average HHV without a consequent recalibration of CEMS equipment would result in a decrease in CEMS readings. This would allow the facility to burn more, rather than less, waste and still meet allowable emissions levels.

The relationship of HHV to facility throughput described above, is a simple expression of how facility capacity is related to the HHV of the fuel it is burning. However, numerous other factors may also come into play which will also have some effect upon throughput such as the operation of the grate system, how much air is injected into the boiler, the moisture content of the garbage and whether or not the facility is operating at maximum capacity.

There are few studies in the general literature that discuss the relationship of HHV to boiler operations for solid waste combustion facilities. The equations discussed above, which are the basis for the argument that greater disposal capacity is needed in Massachusetts than previously determined in the 1990 Solid Waste Master Plan, indicate that there is an inverse relationship whereby a rise in HHV of waste results in a consequent decrease in the throughput of a facility. The Department sponsored a study by Roy F. Weston, Inc. (Goldman, 1994) to examine the relationship between the heat content of solid waste and the quantity of waste that the facilities can process based upon their maximum heat release rates. A summary of this analysis, presented below, has been modified to reflect the actual availability of the facilities as reported to the DEP. This analysis of throughput based on maximum heat release rates in relation to HHV of the waste establishes the extent to which Massachusetts facility throughputs are potentially affected by the HHV of the waste. The Weston study also

determined, based on 1992 data obtained from facility operators, that the HHV of solid waste is between 5100 and 5300 Btu/lb.

Table 4: SUMMARY OF IMPACTS OF HEATING VALUE ON THROUGHPUT OF MASSACHUSETTS FACILITIES (based on actual availability)

	Throughputs in Tons per Year with an Average HHV of:			
Facility	4,000 Btu/lb	4,500 Btu/lb	5,000 Btu/lb	5,500 Btu/lb
Haverhill	685,000	610,000	546,000	498,000
Lawrence	300,000	269,000	243,000	229,000
Millbury	676,000	598,000	542,000	492,000
N. Andover	579,000	503,000	465,000	422,000
Pittsfield	98,000	87,000	79,000	71,000
Saugus	540,000	540,000	514,000	466,000
SEMASS	1,089,000	969,000	874,000	796,000
Springfield	150,000	134,000	118,000	112,000
TOTALS	4,117,000	3,710,000	3,381,000	3,086,000

The Weston study indicates that the maximum heat release rate is the most significant factor in limiting throughput at a facility. One of DEP's integrated solid waste management goals is to burn 50 pecent of the MSW generated within Massachusetts. Using a generation rate of 6.75 million tons per year of MSW this amounts to 3.375 million tons per year. It is worth noting that based on the information presented in Table 4 above, this would be accomplished at a HHV of 5000 Btu/lb. If HHV drops, greater than 50 percent of the MSW could theoretically be burned and if HHV rises above 5000 Btu/lb less than 50 percent could be burned. However, as the Weston study and other studies suggest, there are also other factors which may modify this inverse relationship in actual practice.

One of the most comprehensive studies of HHV and its effect on facility operations was carried out on the Gallatin, Tennessee waste-to-energy facility in the early 1980s (Sommer, et al.). This study examined the effects of pre-processing solid waste by removal of glass, metal, and aluminum on operations of a small mass-burn facility. Pre-processing waste resulted in the following data, expressed as the percentage change when compared to burning unprocessed solid waste:

Table 5: COMPARISON OF PRE- AND POST-PROCESS WASTE

	Pre-process	Post-process	Percent Change
HHV of Waste	4448 Btu/lb	5865 Btu/lb	17.4
Net Heat Release	31.9 MMBtu	35.7 MMBtu	-12
Std. Deviation of HHV	22%	9.5%	12..5
On-Line Reliability	85%	93.7%	10.3
Throughput of Waste	170 TPD	162 TPD	-4.7

Most noteworthy is that, while pre-processing to remove non-combustibles caused the average HHV of waste to rise by 17.4 percent, the throughput of the incinerator decreased by only 4.7 percent. This indicates a very different and potentially more complex relationship of HHV to throughput than suggested by the proponents of facilities in Massachusetts.

The damping of the effect of rising HHV on throughput is explained by examining the facility's design and the availability of the incinerator. Design is determined, in part, by the maximum heat input of the boilers, which is based on the average assumed HHV of solid waste. Solid waste, a heterogeneous fuel, will have heating values that vary significantly both above and below this average value on a daily, weekly, or yearly basis.. Excursions above and below the average HHV will occur regularly within the boilers. Because a boiler can be damaged by too much heat, a boiler's performance guarantee level is generally set below the maximum heat release design capacity so that the boiler can absorb some of the variability in the HHV of the fuel without risking damage to the facility. Ideal operation will maximize throughput and energy recovery while minimizing excursions over boiler heat release limits and stoker loading limits due to fuel variability. Morcos (1988) notes that due to this variable nature of solid waste fuel, waste-to-energy facilities "must be robust", ie. have the capability of absorbing wide variability in the HHV of waste.

In the case of the Gallatin facility, Sommer has noted that the maximum heat release capacity is 22 percent greater than the performance guarantee average heat release capacity. Therefore, the facility can operate within this performance "window", with waste that has an HHV greater than the average HHV without harming the facility, and without the need to significantly decrease throughput. This can occur because processing the fuel, by removal of non-combustibles, also decreased the variability in the heating value of the fuel, and so decreased the potential for excursions above the maximum heat rate.

Another study (Hasselriis, et al., 1990) examined the operation of a facility in Babylon, N.Y. The average HHV on which this facility was designed is 4450 Btu/lb. The service agreement allows the facility to burn waste with an HHV ranging from 3800 Btu/lb to 5200 Btu/lb; at 5200 Btu/lb, the waste throughput must be adjusted. The operating "window" within which the HHV of waste may vary was found by Sommer to equal one standard deviation above the mean HHV of waste sampled and analyzed in the study. Based on HHV data for one month, 5200 Btu/lb represents approximately one standard deviation above the average HHV specified in the service agreement.

The Gallatin facility study Sommer indicates that pre-processing fuel to remove non-combustibles decreased the variability of the fuel to about one half that of the unprocessed waste. While this fuel releases more heat per pound of material, Gallatin is capable of using the excess heat released without significantly decreasing throughput. This is because the mean fuel value of the pre-processed fuel remains within one standard deviation of that guaranteed in the service agreement and, therefore, falls within the maximum design heat release capacity of the facility. The average fuel value of pre-processed waste, therefore, remains within the operating window. The equations presented at the beginning of this discussion would suggest that the throughput for the Gallatin facility, at an HHV of 5500 Btu/lb, would fall to 69.54 TPD. However, throughput decreased only 4 TPD, from 85 TPD to 81 TPD, due to the design capability to absorb the greater heat input.

Increased boiler efficiency may result from removal of non-combustible materials, in part because they cause significant heat losses. Non-combustible materials largely end up as ash and they increase fouling or slagging of boiler walls. Morcos (1989) indicates that unburnt material can account for 7 percent of heat loss. Slagging can impede heat transfer within the boiler, further decreasing efficiency. Reduction of slagging can increase on-line availability by reducing down-time and maintenance costs (Shortsleeve and Roche, 1991). Data from Sommer indicate that both boiler efficiency and on-line availability can be increased. At the Gallatin facility, boiler efficiency increased by 9.5 percent and on-line availability by 10 percent. These results would translate into increased revenue from sales of energy, tipping fees, and decreased costs of maintenance.

One other factor not mentioned in any studies, but which affects the operations of combustion facilities is the seasonality of waste generation. Maximum waste generation generally occurs in the spring/early summer and in the fall, while minimum waste generation generally occurs in January and February. It has been assumed that this seasonality in waste generation is partially due to the generation of yard waste in spring and fall. It may also be assumed that the HHV of waste generated in the winter is higher than that generated during peak periods of spring and fall because of the prevalence of paper. If this is true, combustion facilities burn waste with a high HHV during those periods of the year when it has the greatest amount of excess capacity due lower generation rates and vice versa. This relationship may also offset any HHV related effects on a yearly basis.

Every solid waste combustion facility is designed to burn waste with a specified average HHV and is capable of burning highly variable waste. The operating constraints are facility-specific and can be determined only by examining each facility's operating parameters and determining the variability of the waste fuel for that facility. Existing solid waste combustion facilities should be capable of handling waste with an increasing HHV in the future with little effect on throughput as long as there is also a corresponding decrease in the variability of the HHV of the waste.

DEP projects that recycling will not result in a large increase in HHV because both low Btu and high Btu materials are targeted for diversion by DEP. Future diversion should decrease the variability of the waste stream, remove moisture, and decrease the seasonality of waste generation. All these factors should promote greater efficiency within existing facilities and should promote greater on-line availability. These factors alone may outweigh any small decreases in throughput due to increased average HHV.

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APPENDIX A

SUMMARY OF METHODOLOGIES AND DATA SOURCES

This document is a complementary volume to the 1994 Solid Waste Master Plan Update. Its purpose is to provide explanation of the methodologies used by the Department in estimating the municipal solid waste (MSW) generation, diversion, and disposal figures included in the Master Plan Update. The Department of Environmental Protection strongly believes that the use of reliable methodologies and data for calculating the status of the Massachusetts Integrated Solid Waste Management System (ISWM) is essential for accurate determination of whether goals are being met, and more importantly, to plan for future solid waste needs.

The text below describes the various methodologies and data sources used in the Master Plan Update. A summary of calculations and methods can be found on page A-7. Corresponding spreadsheets follow this text.

DEFINITION OF KEY TERMS

Municipal Solid Waste: Wastes such as durable and nondurable goods, containers and packaging, food scraps, yard trimmings, and other miscellaneous wastes from residential, commercial, institutional, and industrial sources.

Difficult-to-Manage Wastes: Wastes such as construction and demolition debris, municipal sludges, combustion ash, and household hazardous wastes.

Generation: Refers to the entrance of materials and products into the waste stream, before diversion or disposal take place.

Diversion: Refers to the removal of waste from the waste stream for the purpose of recycling or composting.

Disposal: Refers to the processing and final disposal of waste at either a landfill or combustion facility.

POPULATION

Per capita generation rates were used in estimating MSW generation. The population figures used in this Update are based on data from the 1990 Federal Census and projections from the Massachusetts Institute for Social and Economic Research (MISER). MISER provided the State with community by community population projections for the years 1995 and 2000. From these figures, projected population numbers were interpolated, (calculated using the difference between two known points).

EXAMPLE:

$$1992\ \text{population} = \left[\frac{(1995\ \text{Pop} - 1990\ \text{Pop})}{5} \times 2\right] + 1990\ \text{pop}$$

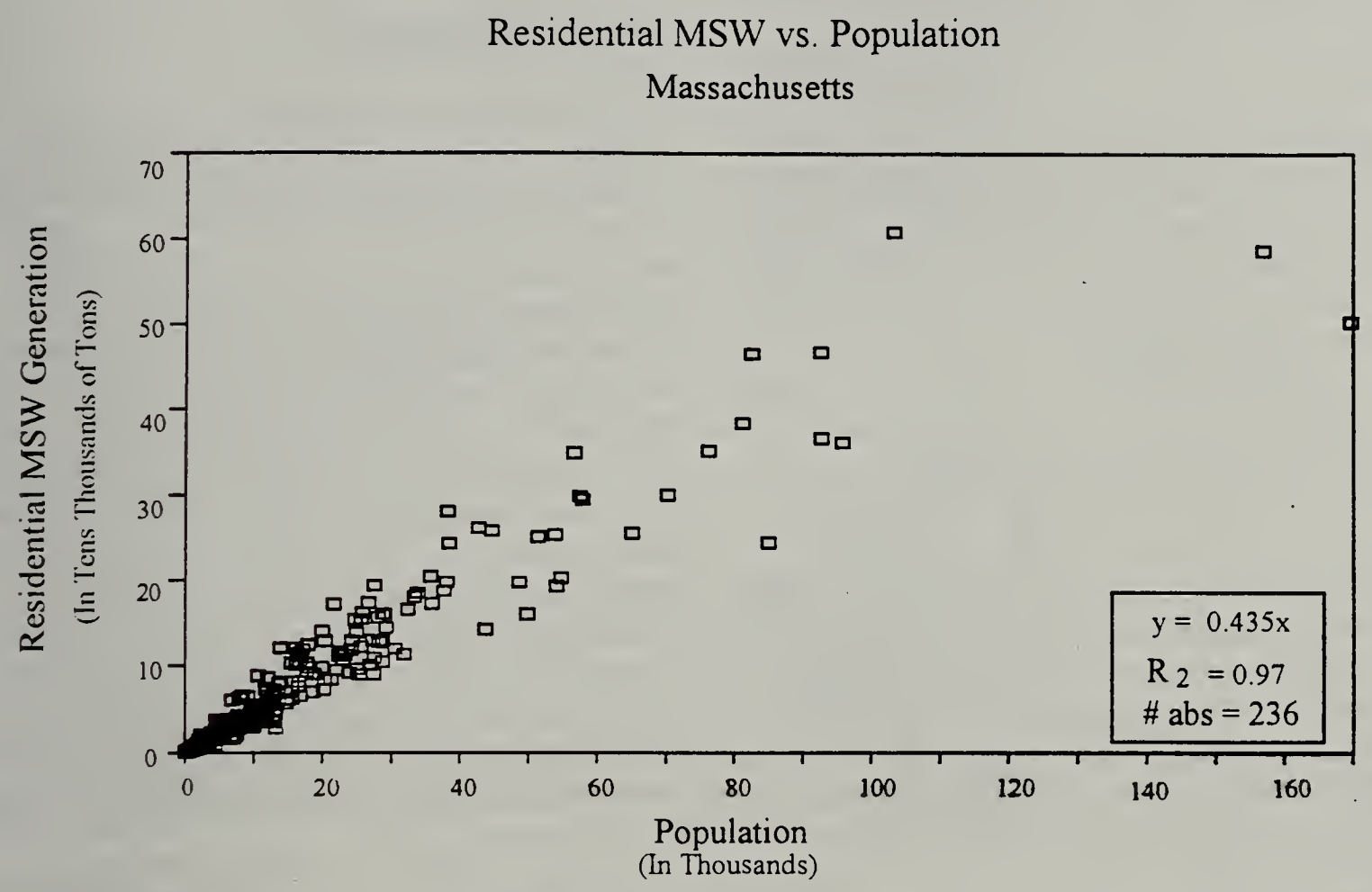
Where: 1990 and 1995 are two known points; 5 is the number of periods between them; 2 is the difference from 1990 to 1992; 1990 is the base year from which we are calculating.

DEP has included reported tourism numbers from 22 cities and town in the State. Tourism projections for 32 communities in the Berkshire County was unavailable. For the numbers that were reported, tourism projections were calculated for the milestone years (1992, 1996, and 2000).

MSW GENERATION

There are two primary components of Municipal Solid Waste: residential and commercial. Residential waste includes those wastes generated

Figure A-1



by Massachusetts households, and commercial waste is generated by the State's many businesses, institutions, and industries.

Residential Generation

The Master Plan Update employs a survey approach in estimating MSW generation for the residential sector. Rapid expansions of recycling and composting programs necessitate that the quantities diverted be carefully identified and combined with the "disposed" values to obtain accurate generation numbers. Generation data from the following four recent municipal surveys were evaluated and used for community by community estimation of residential MSW generation:

1) 1992 and 1991 Division of Solid Waste Management Recycling Equipment Grant Application Survey,
2) Data from the Division of Local Mandates' 1991 statewide survey,
3) Residential tonnage received at municipal landfills during 1991 and,
4) Total tonnage received at WTE facilities from 1991 to 1992.

This data set encompasses more municipalities and survey sources than the data set used for the 1990 Master Plan, and thereby offers more reliable information.

Residential waste generation rates were determined by assigning a default priority to these data sources. The Recycling Equipment Grant Application information included municipal waste generation rates for 1991 and 1992, summing disposal, composting and recycling tonnages. The Division of Local Mandates' survey covered 1991 MSW tonnage disposed by cities and towns, as well as information on composting and recycling tonnages. Composting information was also provided by Division of Solid Waste Management compost staff from their 1991 survey.

The Department was able to gather reliable data for 236 cities and towns. A regression analysis of this data yielded a good correlation between tons of MSW generated and community size. Results are shown in Figure A-1. Per capita population rates were calculated for each community by dividing the community's tonnage by its population. Results provided the basis for estimating generation figures for the 115 communities whose survey information was unreliable or unavailable.

Commercial Generation

Two methodologies are used to estimate commercial waste generation. One approach involved analyzing the composite of disposal data from landfills, combustion facilities, and state-wide diversion numbers. Using this methodology, waste disposed at landfills and waste-to-energy facilities were added to composting and recycling tonnages to obtain a statewide generation total. From this total residential waste disposed and diverted was subtracted, the remainder was assumed to be commercial waste.

The second approach incorporated an analysis of employment data, industrial classification codes, and industry per capita generation estimations. This method estimated the waste generation rate per employee for each standard industrial classification identified in Massachusetts using the following equation:

Tons of MSW = (Tons of MSW per Employee)
X (# of Employees)

Estimated tonnages for each classification code were added together to derive a total commercial generation figure.

The first method resulted in a commercial generation total of 3.5 million tons for 1992. The other estimated 3.7 million tons, a five percent difference. 3.5 million tons was utilized in all subsequent calculations. The economic downturn of 1992, led DEP to assume the industry classification and employment data method slightly inflated commercial waste generation for this period.

MSW COMPOSITION

The Commonwealth utilized waste composition values from the Environmental Protection Agency for the estimating of MSW composition. The reason for using the EPA model is its plausibility and "official" status, as well as the lack of a superior alternative. However, there are inherent problems with applying a national profile to a specific state: regional differences tend to be overlooked. A key example is the six percent EPA value for container glass in MSW. Massachusetts is believed to have much less glass in its waste stream due to the material substitution which beverage distributors and retailers adopted in response to the deposit law (soda and carbonated beverages in supermarkets are almost entirely packaged in aluminum or plastic, Budweiser uses only refillable glass bottles). This difference between Massachusetts and non-bottle bill states is lost in the national profile. A second example is the percentage of MSW represented by yardwaste in Massachusetts may be different from that of the national average.

MSW DIVERSION

The 1990 Master Plan estimated the recycling rate to be ten percent. This percentage was based on bottle bill recycling estimates, commercial recycling levels and limited survey information of residential recycling and composting. By contrast, for this Update, research and analysis of waste diversion levels for 1992 has been conducted through the review of four discrete subsets: residential recycling, residential composting, commercial recycling and commercial composting. Each is reviewed separately below.

Residential Recycling

The estimate for residential sector recycling is based primarily on the tabulation of tonnage reports from municipalities. Information from 1991 and 1992 municipal surveys (reporting on 1990 and 1991 activity) provided tonnage data for more than

200 communities. For each of the major recyclable materials, there were as many as 50 to a 100 municipalities that provide recycling services but which have not reported tonnage. Estimates for the tonnage recycled by these municipalities were extrapolated using calculated materials recovery rates for those municipalities who reported their tonnage.

Bottle bill recycling results are credited toward the residential recycling rate. Container recovery (deposit redemption) rates are obtained from the Massachusetts Department of Revenue. The recycled tonnage represented by the recovered container stream is estimated using trade association data on both material composition of the beverage container stream (glass, aluminum, plastic, etc.) and average unit weights for different container types. Composition percentages have been adjusted to reflect Massachusetts specific conditions based on information provided by deposit container collection companies.

Residential Composting

The 1990 Master Plan did not specifically estimate residential composting levels. For this Update, residential leaf and yard waste diversion numbers are derived using municipally reported quantities from three different surveys (measuring 1990 and 1991 activity) and from extrapolations for non-reporting communities. In addition, a study, aimed at estimating Massachusetts' organic waste diversion levels has recently been completed.

This study compiled data for several components of the organic waste stream. First, a statistically significant sample of households was surveyed to determine diversion levels achieved through backyard composting. Second, organic diversion data was gathered and compiled through surveys of municipal composting facilities that have not filed an annual facility report with DEP. Third, landscaping companies were surveyed for estimates of the quantities of residential organic waste collected and delivered to commercial composting operations. Results of the study confirm that a significantly higher amount of waste was composted in 1992 than in 1990. These results are reflective of both an increased rate in composting, and improvements in the accuracy of estimates.

Commercial Recycling

DEP conducted an analysis of "value added" by the recycling industries of Massachusetts in 1992. This survey sought to determine the quantities of materials baled (or otherwise densified) by processors of glass, steel, aluminum, plastic and paper. The survey used "baled" tonnage to represent the tonnage of a particular material collected for recycling in Massachusetts. Total quantities of waste recycled, for the major material types, was then calculated.

In 1994, another study, which confirmed and built on the previous study's analysis, was completed. The methodology used involved estimating total recycling and then subtracting residential recycling to derive a commercial recycling estimate. This approach was used due to the relative difficulty in estimating commercial recycling directly, and the relative accuracy of residential recycling estimates.

To quantify amounts recycled, data was gathered by surveying material processors. The surveys solicited information on the quantity, type and origin (in- or out-of-state) of the material(s) processed. Data was compiled into five main categories: paper, plastics, cans, other metals, and glass. For the responding firms, a processing rate, in tons per employee per year, was determined for each material or processor type. Employment data was used to extrapolate estimates for non-responding firms.

Recycling quantities estimated using this method were based on post-manufacturing activities, meaning that broken glass, paper, and steel trimmings recovered at the back-end of the production process are not included in the totals.

Commercial Composting

As with residential composting levels, the 1990 Master Plan did not specifically estimate commercial composting levels. A study, surveying commercial composting facilities, and primary

wood waste generators and processors, has been performed. A review of Massachusetts Department of Food and Agriculture's database on agricultural composting operations has also been completed.

MSW COMBUSTION FACILITIES

There are nine combustion facilities operating in Massachusetts. Six utilize a mass burn technology that recaptures energy, two process refuse derived fuel before burning and recapture energy, and one, a municipal incinerator neither processes MSW nor recaptures energy.

Estimates for tons of MSW burned are based on 1992 on-line availability figures received from each of the State's active combustion facilities, except for the Fall River incinerator. This facility is designed to operated at 52,000 tons burned annually.

Pre- and post-burn separation of metals have been tracked. Two facilities perform pre-burn separation of ferrous materials. Six perform post-burn recovery of metals, and one facility performs both pre- and post- burn metal recoveries.

Tonnage of MSW combustion ash generated was calculated by multiplying the actual tonnage burned by the percentage of reduction efficiency of the technology used. Mass-burn technology was calculated to generate ash at 25 percent of total tons burned, and resource derived fuel technology at 16 percent of the total amount burned. Total tonnage of ash generated included accounting for post-burn metal recovery tonnages.

MSW LANDFILLS

The Department calculates annual landfill capacity by adding together each solid waste landfill facility's permitted annual or daily tonnage multiplied by the number of yearly operating days. Site information is updated yearly and as MSW landfills close, landfill capacity is subtracted from the annual statewide total.

The amount of MSW landfilled was calculated using data from facility annual operating reports and facility survey information. Annual landfill disposal figures also include extrapolations using generation figures and quantities disposed of at other locations.

As described in the Master Plan Update, landfill capacity has been used for the disposal of out-of-state generated MSW, construction and demolition debris, waste water treatment plant sludge, recycling debris, as well as Massachusetts generated MSW.

Massachusetts was a net importer of MSW in 1992. Because imported MSW tonnages are not specifically tracked, figures received from other states, in combination with tons known to be exported, are used to calculate the net import and export disposal estimates. Import information was gathered by a DEP survey of seven Northeastern states, who are known to import into Massachusetts.

DIFFICULT TO MANAGE WASTE

The State estimates that 640,000 tons of C&D, WWTP sludge and recycling debris was disposed of at municipal solid waste disposal facilities in 1992, or ten percent of gross MSW generated. Because tonnages for these materials have not been specifically tracked, the State uses a variety of sources and assumptions for calculation. A survey of private landfill operators, however, revealed that approximately 400,000 tons of non-MSW was disposed at these facilities in 1992. Incinerator ash is not included in this estimate.

The processing of recyclable materials generates an amount of residuals or recycling debris that must be disposed of. This material is generally disposed of at solid waste landfills and is estimated to be two percent of the total tons recycled.
A known amount of sludge is generated by the State's many waste water treatment plants. Approximately 70,000 tons of dewatered sludge needed disposal in 1992. Much of this amount was disposed of at solid waste landfills.

An estimate of the amount of C&D disposed of at solid waste landfills is one of the most difficult figures to calculate. The amount of C&D generated is largely a function of the State's economy. A portion is disposed of at landfills dedicated exclusively to C&D disposal, and much is recycled. An on-going survey of C&D processing firms is currently being conducted by DEP staff. Preliminary results have shown that over one million tons of C&D was processed for recycling or re-use in 1993.

MSW CAPACITY PROJECTIONS

DEP recognizes that the nature of the regulatory involvement in, and the economic demands of environmental protection, public health and safety, and solid waste management make the projecting of future permitted disposal capacity difficult. For the purposes of this Master Plan Update, capacity projections do not include any proposed facilities or any proposed expansions unless a permit has been issued to the facility. Permit for the construction of a combustion facility in Shirley, a solid waste landfill in Dartmouth, and a draft permit for a landfill in East Bridgewater have been issued.

Each existing active facility is assigned an estimated closure date based on site capacity and permitted tonnage, or on operating permit expiration. In October of 1993, unlined landfill owners were asked by DEP to submit a notification of their intent to operate beyond December of 1993. As part of this notification, the owners conveyed the date in which their facility would cease operation. Closure dates were then established by assigning either the date indicated by the owner, or a date based on the facility's classification as a threat to the environment and public health, which ever came first. Those facilities classified as a significant threat are assumed to not be operating beyond 1995. Those classified as potential, or little or no threat or insufficient data to classify are assumed to close before the milestone year of 2000, with the potential threat facilities closing first.

The total MSW generated in 1992 shows a five percent decrease since 1990. This decrease is attributed to source reduction and economic recession. It is assumed that achievement in source reduction successfully offset anticipated growth in per capita generation, and that the current economic recession is responsible for the actual decrease in tonnage generated. Therefore, the DEP will continue to employ its expected generation rate of 6.75 million tons of MSW as the base for projecting system size for this decade.

The DEP will also continue to assume that the goals outlined in the 1990 Solid Waste Master Plan will be met. These goals and other assumptions underlying the statewide ISWM projections are listed below:

- All landfills will close according to current permit or projected dates (whichever is the greater restriction);
- Existing combustion facilities will operate at full capacity, with on-line availability determined on a facility specific basis;
- Source reduction will offset growth in population and per capita generation of MSW, resulting in a MSW generation total of 6.75 million tons for 1996 and 2000;
- Recycling goals will be met (34 percent by 1996 and 46 percent by 2000);
- 50 percent of MSW will be combusted by 2000, and four percent landfilled;
- An amount of disposal capacity at solid waste facilities accepting MSW will continue to be used for the disposal of difficult to manage waste. This amount will equal ten percent of gross MSW generated;
- And, finally the State will be neither a net importer or exporter of municipal solid waste.

APPENDIX B

MASSACHUSETTS SOLID WASTE MANAGEMENT SYSTEM PROFILE FOR 1992--
Provides a profile of the diversion and disposal of the gross tons of Municipal Solid Waste generated in 1992. The profile includes the amount and percents composted, recycled, combusted, landfilled and exported.

APPENDIX B **MASSACHUSETTS MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM PROFILE FOR 1992**

	1992 MA GENERATION MSW	MSW COMPOSTED	MSW RECYCLED		MSW COMBUSTED(	MSW LANDFILLED(	MSW EXPORTED
RESIDENTIAL	2,900,000	500,000	PAPER	685,000	3,060,000	1,190,000	400,000
COMMERCIAL	3,500,000		GLASS	164,000			
			METAL	386,000			
			PLASTIC	37,000			
TOTAL	6,400,000	500,000		1,300,000	3,000,000	1,200,000	400,000
% OF GENERATION		8%		20%	47%	19%	6%

COMPOST + RECYCLE TOTAL = 1,800,000 or 28%

Notes:
1) Total numbers are rounded to the 100,000 place
2) Landfill total does not include imported waste or the disposal of non-MSW waste
3) Includes accounting for imported waste.

APPENDIX C

MASSACHUSETTS RECYCLING RATE SUMMARY FOR 1992: presents, material by material, estimated recycled quantities and recovery rates for the residential sector (including bottle bill material), the commercial sector and for all Municipal Solid Waste.

APPENDIX C: MASSACHUSETTS MSW DIVERSION

	GLASS	STEEL	PAPER	PLASTIC	ALUMINUM	YARDWASTE (2)	TOTALS
COMMERCIAL GENERATION	197,278	286,355	1,575,919	393,577	52,722	669,162	3,175,013
RESIDENTIAL GENERATION	229,060	114,530	810,301	134,573	36,363	896,199	2,221,026
TOTAL MSW GENERATION	426,338	400,885	2,386,220	528,150	89,086	1,565,360	5,396,039
MUNICIPAL COLLECTION	29,447	68,344 (1)	128,779	3,336	865	350,000	580,771
BOTTLE BILL COLLECTION	38,148	0	0	7,456	21,874	0	67,478
SUBTOTAL - RESIDENTIAL	67,595	68,344	128,779	10,792	22,739	350,000	648,249
RESIDENTIAL RECYCLING RATE	0.30	0.60	0.16	0.08	0.63	0.39	0.226
COMMERCIAL COLLECTION	96,000	295,000	556,000	26,000	0	180,000	1,153,000
COMMERCIAL RECYCLING RATE	0.49	1.03	0.35	0.07	0.00	0.27	0.329
TOTAL COLLECTION	163,595	363,344	684,779	36,792	22,739	530,000	1,801,249
TOTAL RECYCLING RATE	0.38	0.91	0.29	0.07	0.26	0.34	0.283

NOTES:

(1) Municipal steel total includes 8,344 tons of steel containers and 60,000 tons of white goods.
(2) Includes food trimmings
(3) Material Generation Totals are based on EPA composition estimates.

APPENDIX D

MASSACHUSETTS POPULATION AND MSW GENERATION ESTIMATES: presents population and Municipal Solid Waste Generation estimates for 1992 for each Massachusetts community. Also included is each community's residential per capita MSW generation rate. Tourism estimates are also included where possible.

APPENDIX D: Massachusetts Population and MSW Generation Estimates

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION	
ABINGTON	0.44	13,817		13,775	5,992	*
ACTON	0.70	17,872		18,122	12,618	
ACUSHNET	0.44	9,554		9,575	4,165	*
ADAMS	0.34	9,445		9,450	3,202	
AGAWAM	0.33	27,323		27,602	9,092	
ALFORD	0.70	418		424	298	
AMESBURY	0.44	14,997		15,232	6,626	*
AMHERST	0.44	35,228		34,850	15,160	*
ANDOVER	0.49	29,151		29,093	14,367	
ARLINGTON	0.58	44,630		44,213	25,566	
ASHBURNHAM	0.44	5,433		5,667	2,465	*
ASHBY	0.44	2,717		2,971	1,292	*
ASHFIELD	0.28	1,715		1,775	505	
ASHLAND	0.42	12,066		12,502	5,284	
ATHOL	0.44	11,451		11,547	5,023	*
ATTLEBORO	0.63	38,383		38,065	24,099	
AUBURN	0.40	15,005		14,956	6,033	
AVON	0.56	4,558		4,658	2,628	
AYER	0.37	6,871		6,883	2,555	
BARNSTABLE	0.44	40,949	52,141	54,044	23,509	*T
BARRE	0.79	4,546		4,756	3,760	
BECKET	0.40	1,481		1,700	678	
BEDFORD	0.55	12,996		13,100	7,235	
BELCHERTOWN	0.44	10,579		11,175	4,861	*
BELLINGHAM	0.44	14,877		15,189	6,607	*
BELMONT	0.62	24,720		24,574	15,235	
BERKLEY	0.37	4,237		4,427	1,630	
BERLIN	0.44	2,293		2,311	1,005	*
BERNARDSTON	0.44	2,048		2,070	900	*
BEVERLY	0.74	38,195		38,100	28,030	
BILLERICA	0.50	37,609		38,399	19,152	
BLACKSTONE	0.44	8,023		8,223	3,577	*
BLANDFORD	0.44	1,187		1,251	544	*
BOLTON	0.44	3,134		3,230	1,405	*
BOSTON	0.43	574,283		582,107	252,193	
BOURNE	0.44	16,064	22,046	22,842	9,936	*T
BOXBOROUGH	0.20	3,343		3,445	686	
BOXFORD	0.42	6,266		6,580	2,754	
BOYLSTON	0.47	3,517		3,573	1,682	
BRAINTREE	0.55	33,836		34,295	18,738	
BREWSTER	0.44	8,440	13,333	14,189	6,172	*T
BRIDGEWATER	0.39	21,249		21,203	8,312	
BRIMFIELD	0.21	3,001		3,157	652	
BROCKTON	0.40	92,788		91,404	36,144	
BROOKFIELD	0.66	2,968		3,051	1,999	
BROOKLINE	0.37	54,718		53,898	19,944	
BUCKLAND	0.44	1,928		1,995	868	*
BURLINGTON	0.48	23,302		23,372	11,270	
CAMBRIDGE	0.38	95,802		95,126	35,964	
CANTON	0.44	18,530		18,909	8,226	*
CARLISLE	0.51	4,333		4,553	2,313	
CARVER	0.83	10,590		11,589	9,657	

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION
CHARLEMONT	0.44	1,249		1,307	569 *
CHARLTON	0.57	9,576		9,846	5,655
CHATHAM	0.44	6,579	11,242	11,491	4,999 *T
CHELMSFORD	0.51	32,383		32,907	16,829
CHELSEA	0.56	28,710		27,859	15,558
CHESHIRE	0.30	3,479		3,577	1,060
CHESTER	0.44	1,280		1,305	568 *
CHESTERFIELD	0.20	1,048		1,236	249
CHICOPEE	0.62	56,632		56,977	35,042
CHILMARK	0.50	650	1,652	1,707	848 T
CLARKSBURG	0.67	1,745		1,768	1,191
CLINTON	0.21	13,222		13,084	2,756
COHASSET	0.52	7,075		7,341	3,833
COLRAIN	0.29	1,757		1,793	518
CONCORD	0.70	17,076		17,425	12,125
CONWAY	0.26	1,529		1,593	417
CUMMINGTON	0.51	785		865	442
DALTON	0.22	7,155		7,029	1,561
DANVERS	0.53	24,174		24,407	13,024
DARTMOUTH	0.44	27,244		27,436	11,935 *
DEDHAM	0.39	23,782		23,887	9,216
DEERFIELD	0.50	5,018		5,079	2,530
DENNIS	0.44	13,864	27,299	27,898	12,136 *T
DIGHTON	0.59	5,631		5,713	3,395
DOUGLAS	0.29	5,438		5,549	1,592
DOVER	0.59	4,915		5,056	2,965
DRACUT	0.48	25,594		26,586	12,665
DUDLEY	0.44	9,540		9,595	4,174 *
DUNSTABLE	0.54	2,236		2,363	1,268
DUXBURY	0.58	13,895		14,266	8,295
EAST BRIDGEWATER	0.44	11,104		11,077	4,819 *
EAST BROOKFIELD	0.39	2,033		2,016	789
EAST LONGMEADOW	0.37	13,367		13,404	4,963
EASTHAM	0.44	4,462	9,212	9,591	4,172 *T
EASTHAMPTON	0.39	15,537		15,825	6,197
EASTON	0.49	19,807		20,064	9,929
EDGARTOWN	0.44	3,062	10,209	10,678	4,645 *T
EGREMONT	0.57	1,229		1,291	742
ERVING	0.20	1,372		1,438	285
ESSEX	0.35	3,260		3,241	1,130
EVERETT	0.57	35,701		35,444	20,272
FAIRHAVEN	0.74	16,132		16,066	11,937
FALL RIVER	0.50	92,703		91,379	46,131
FALMOUTH	0.56	27,960	39,286	40,182	22,419 T
FITCHBURG	0.44	41,194		40,787	17,742 *
FLORIDA	0.44	742		750	326 *
FOXBOROUGH	0.38	14,637		15,081	5,796
FRAMINGHAM	0.39	64,989		65,791	25,816
FRANKLIN	0.43	22,095		22,764	9,749
FREETOWN	0.44	8,522		8,739	3,877
GARDNER	0.36	20,125		20,123	7,199
GAY HEAD	0.44	201	405	434	189 *T

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION
GEORGETOWN	0.44	6,384		6,523	2,838 *
GILL	0.44	1,583		1,592	693 *
GLOUCESTER	0.36	28,716		29,224	10,638
GOSHEN	0.44	830		921	401 *
GOSNOLD	0.44	98		84	37 *
GRAFTON	0.37	13,035		13,077	4,802
GRANBY	0.44	5,565		5,712	2,485 *
GRANVILLE	0.44	1,403		1,490	648 *
GREAT BARRINGTON	0.44	7,725		7,632	3,320 *
GREENFIELD	0.37	18,666		18,507	6,853
GROTON	0.25	7,511		7,894	1,997
GROVELAND	0.44	5,214		5,261	2,289 *
HADLEY	0.39	4,231		4,210	1,629
HALIFAX	0.56	6,526		6,678	3,719
HAMILTON	0.46	7,280		7,387	3,399
HAMPDEN	0.33	4,709		4,845	1,605
HANCOCK	0.44	628		622	270 *
HANOVER	0.58	11,912		11,896	6,953
HANSON	0.44	9,028		9,161	3,985 *
HARDWICK	0.43	2,385		2,475	1,068
HARVARD	0.44	12,329		12,674	5,513 *
HARWICH	0.44	10,275	16,035	16,502	7,178 *T
HATFIELD	0.44	3,184		3,248	1,413 *
HAVERHILL	0.49	51,418		52,069	25,416
HAWLEY	0.44	317		349	152 *
HEATH	0.33	716		710	234
HINGHAM	0.44	19,821		19,671	8,557 *
HINSDALE	0.35	1,959		2,007	696
HOLBROOK	0.44	11,041		11,312	4,921 *
HOLDEN	0.41	14,628		14,630	6,001
HOLLAND	0.44	2,185		2,324	1,011 *
HOLLISTON	0.50	12,926		13,279	6,664
HOLYOKE	0.33	43,704		42,463	13,845
HOPEDALE	0.31	5,666		5,525	1,736
HOPKINTON	0.45	9,191		9,701	4,340
HUBBARDSTON	0.45	2,797		2,834	1,286
HUDSON	0.44	17,233		17,792	7,739 *
HULL	0.44	10,466		10,262	4,464 *
HUNTINGTON	0.29	1,987		2,031	589
IPSWICH	0.55	11,873		12,145	6,656
KINGSTON	0.45	9,045		9,155	4,116
LAKEVILLE	0.35	7,785		8,161	2,830
LANCASTER	0.44	6,661		6,652	2,894 *
LANESBOROUGH	0.44	3,032		3,156	1,373 *
LAWRENCE	0.43	70,207		67,802	28,995
LEE	0.56	5,849		5,876	3,284
LEICESTER	0.44	10,191		10,272	4,468 *
LENOX	0.38	5,069		5,096	1,961
LEOMINSTER	0.44	38,145		38,311	16,665 *
LEVERETT	0.54	1,785		1,826	990
LEXINGTON	0.55	28,974		29,135	16,089
LEYDEN	0.44	662		722	314 *

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION
LINCOLN	0.37	7,666		7,882	2,918
LITTLETON	0.44	7,051		7,259	3,158 *
LONGMEADOW	0.67	15,467		15,545	10,405
LOWELL	0.59	103,439		102,389	60,183
LUDLOW	0.48	18,820		19,118	9,163
LUNENBURG	0.71	9,117		9,203	6,517
LYNN	0.47	81,245		80,018	37,758
LYNNFIELD	0.48	11,274		11,313	5,419
MALDEN	0.47	53,884		53,743	25,261
MANCHESTER	0.53	5,286		5,362	2,846
MANSFIELD	0.49	16,568		16,762	8,229
MARBLEHEAD	0.70	19,971		19,895	13,916
MARION	0.83	4,496		4,540	3,756
MARLBOROUGH	0.36	31,813		32,499	11,585
MARSHFIELD	0.80	21,531		21,899	17,472
MASHPEE	0.79	7,884	12,792	13,832	10,965 T
MATTAPOISETT	0.44	5,850		5,954	2,590 *
MAYNARD	0.37	10,325		10,544	3,917
MEDFIELD	0.49	10,531		10,846	5,329
MEDFORD	0.52	57,407		56,937	29,605
MEDWAY	0.45	9,931		10,267	4,571
MELROSE	0.45	28,150		28,096	12,666
MENDON	0.41	4,010		4,130	1,711
MERRIMAC	0.44	5,166		5,300	2,306 *
METHUEN	0.44	39,990		40,695	17,702 *
MIDDLEBOROUGH	0.69	17,867		18,049	12,472
MIDDLEFIELD	0.41	392		453	184
MIDDLETON	0.69	4,921		5,182	3,562
MILFORD	0.35	25,355		25,402	8,999
MILLBURY	0.44	12,228		12,201	5,307 *
MILLIS	0.26	7,613		7,838	2,023
MILLVILLE	0.42	2,236		2,341	987
MILTON	0.63	25,725		25,886	16,266
MONROE	0.69	115		112	78
MONSON	0.44	7,776		7,946	3,457 *
MONTAGUE	0.78	8,316		8,310	6,523
MONTEREY	0.44	805		937	407 *
MONTGOMERY	0.44	759		787	342 *
MOUNT WASHINGTO	0.58	135		131	76
NAHANT	0.59	3,828		3,865	2,290
NANTUCKET	0.44	6,012	15,184	15,572	6,774 *T
NATICK	0.39	30,510		30,881	12,099
NEEDHAM	0.70	27,557		27,849	19,538
NEW ASHFORD	0.44	192		186	81 *
NEW BEDFORD	0.44	99,922		98,463	42,831 *
NEW BRAINTREE	0.37	881		878	327
NEW MARLBOROUGH	0.44	1,240		1,347	586 *
NEW SALEM	0.36	802		891	324
NEWBURY	0.44	5,623		5,871	2,554 *
NEWBURYPORT	0.70	16,317		16,664	11,637
NEWTON	0.56	82,585		82,919	46,721
NORFOLK	0.44	9,270		9,724	4,230 *

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION
NORTH ADAMS	0.39	16,797		16,608	6,427
NORTH ANDOVER	0.47	22,792		23,327	10,951
NORTH ATTLEBOROU	0.38	25,038		25,076	9,600
NORTH BROOKFIELD	0.52	4,708		4,732	2,478
NORTH READING	0.71	12,002		12,348	8,788
NORTHAMPTON	0.44	29,289		29,173	12,690 *
NORTHBOROUGH	0.48	11,929		12,061	5,814
NORTHBRIDGE	0.32	13,371		13,363	4,279
NORTHFIELD	0.37	2,838		2,838	1,055
NORTON	0.44	14,265		14,446	6,284 *
NORWELL	0.34	9,279		9,273	3,198
NORWOOD	0.45	28,700		28,957	13,023
OAK BLUFFS	0.44	2,804	9,200	9,017	3,923 *T
OAKHAM	0.44	1,503		1,573	684 *
ORANGE	0.41	7,312		7,540	3,125
ORLEANS	0.44	5,838	8,814	9,207	4,005 *T
OTIS	0.44	1,073		1,144	498 *
OXFORD	0.51	12,588		12,852	6,525
PALMER	0.44	12,054		12,289	5,346 *
PAXTON	0.40	4,047		4,126	1,659
PEABODY	0.44	47,039		47,282	20,568 *
PELHAM	0.27	1,373		1,482	393
PEMBROKE	0.44	14,544		14,817	6,445 *
PEPPERELL	0.30	10,098		10,765	3,208
PERU	0.44	779		858	373 *
PETERSHAM	0.36	1,131		1,140	410
PHILLIPSTON	0.44	1,485		1,471	640 *
PITTSFIELD	0.41	48,622		47,851	19,466
PLAINFIELD	0.23	571		601	139
PLAINVILLE	0.44	6,871		6,987	3,039 *
PLYMOUTH	0.44	45,608		45,617	19,843 *
PLYMPTON	0.45	2,384		2,441	1,098
PRINCETON	0.36	3,189		3,302	1,202
PROVINCETOWN	0.44	3,561	7,736	7,785	3,386 *T
QUINCY	0.29	84,985		85,755	24,660
RANDOLPH	0.44	30,093		30,616	13,318 *
RAYNHAM	0.51	9,867		9,999	5,069
READING	0.51	22,539		22,782	11,715
REHOBOTH	0.44	8,656		9,006	3,918 *
REVERE	0.61	42,786		43,321	26,488
RICHMOND	0.46	1,677		1,693	774
ROCHESTER	0.44	3,921		4,171	1,815 *
ROCKLAND	0.63	16,123		15,928	10,002
ROCKPORT	0.53	7,482		7,519	3,974
ROWE	0.44	378		411	179 *
ROWLEY	0.44	4,452		4,592	1,997 *
ROYALSTON	0.44	1,147		1,207	525 *
RUSSELL	0.44	1,594		1,660	722 *
RUTLAND	0.41	4,936		5,032	2,075
SALEM	0.52	38,091		38,331	19,925
SALISBURY	0.44	6,882		7,572	3,294 *
SANDISFIELD	0.44	667		786	342 *

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION
SANDWICH	0.66	15,489	19,245	20,462	13,561 T
SAUGUS	0.60	25,549		25,690	15,498
SAVOY	0.44	634		705	307 *
SCITUATE	0.66	16,786		16,728	11,088
SEEKONK	0.27	13,046		13,149	3,514
SHARON	0.45	15,517		16,061	7,195
SHEFFIELD	0.44	2,910		2,938	1,278 *
SHELBURNE	0.21	2,012		2,068	429
SHERBORN	0.48	3,989		4,148	2,009
SHIRLEY	0.48	6,118		6,348	3,061
SHREWSBURY	0.49	24,146		24,103	11,826
SHUTESBURY	0.23	1,561		1,606	372
SOMERSET	0.52	17,655		17,597	9,190
SOMERVILLE	0.46	76,210		73,941	34,066
SOUTH HADLEY	0.63	16,685		16,810	10,553
SOUTHAMPTON	0.58	4,478		4,705	2,732
SOUTHBOROUGH	0.52	6,628		6,659	3,441
SOUTHBRIDGE	0.58	17,816		17,499	10,072
SOUTHWICK	0.56	7,667		7,964	4,462
SPENCER	0.62	11,645		11,961	7,456
SPRINGFIELD	0.37	156,983		154,162	57,547
STERLING	0.37	6,481		6,863	2,553
STOCKBRIDGE	0.85	2,408		2,397	2,041
STONEHAM	0.50	22,203		22,605	11,313
STOUGHTON	0.38	26,777		27,566	10,369
STOW	0.51	5,328		5,568	2,832
STURBRIDGE	0.44	7,775		8,090	3,519 *
SUDBURY	0.44	14,358		14,674	6,383 *
SUNDERLAND	0.44	3,399		3,396	1,477 *
SUTTON	0.88	6,824		7,104	6,246
SWAMPSCOTT	0.58	13,650		13,527	7,851
SWANSEA	0.53	15,411		15,575	8,188
TAUNTON	0.32	49,832		49,520	15,862
TEMPLETON	0.59	6,438		6,550	3,882
TEWKSBURY	0.47	27,266		27,820	13,205
TISBURY	0.44	3,120	7,180	7,652	3,329 *T
TOLLAND	0.44	289		304	135
TOPSFIELD	0.50	5,754		5,767	2,894
TOWNSEND	0.44	8,496		9,210	4,007 *
TRURO	0.44	1,573	5,498	5,611	2,441 *T
TYNGSBOROUGH	0.41	8,642		9,203	3,791
TYRINGHAM	0.22	369		392	87
UPTON	0.37	4,677		4,788	1,781
UXBRIDGE	0.50	10,415		10,440	5,174
WAKEFIELD	0.56	24,825		25,191	14,054
WALES	0.44	1,566		1,699	739 *
WALPOLE	0.42	20,212		20,909	8,707
WALTHAM	0.51	57,878		58,128	29,627
WARE	0.29	9,808		9,988	2,914
WAREHAM	0.44	19,232		19,991	8,696 *
WARREN	0.21	4,437		4,493	935
WARWICK	0.33	740		730	241

CITY/TOWN	PER CAP RESID GENERATION RATE	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP 1992 RESID GENERATION
WASHINGTON	0.21	615		636	132
WATERTOWN	0.54	33,284		33,041	17,927
WAYLAND	0.29	11,874		12,146	3,569
WEBSTER	0.44	16,196		16,189	7,042 *
WELLESLEY	0.65	26,615		26,824	17,431
WELLFLEET	0.44	2,493	6,413	6,636	2,887 *T
WENDELL	0.27	899		956	255
WENHAM	0.35	4,212		4,240	1,465
WEST BOYLSTON	0.28	6,611		6,574	1,815
WEST BRIDGEWATER	0.49	6,389		6,444	3,126
WEST BROOKFIELD	0.52	3,532		3,692	1,935
WEST NEWBURY	0.47	3,421		3,562	1,672
WEST SPRINGFIELD	0.40	27,537		27,432	10,859
WEST STOCKBRIDGE	0.44	1,483		1,484	645 *
WEST TISBURY	0.44	1,704	3,381	3,163	1,376 *T
WESTBOROUGH	0.44	14,133		14,074	6,122 *
WESTFIELD	0.44	38,372		38,685	16,828 *
WESTFORD	0.46	16,392		17,014	7,837
WESTHAMPTON	0.34	1,327		1,384	476
WESTMINSTER	0.44	6,191		6,325	2,751 *
WESTON	0.47	10,200		10,378	4,847
WESTPORT	0.87	13,852		14,103	12,249
WESTWOOD	0.45	12,557		12,699	5,671
WEYMOUTH	0.36	54,063		55,258	19,747
WHATELY	0.44	1,375		1,429	621 *
WHITMAN	0.37	13,240		13,147	4,866
WILBRAHAM	0.29	12,635		12,796	3,666
WILLIAMSBURG	0.39	2,515		2,626	1,028
WILLIAMSTOWN	0.44	8,220		8,108	3,527 *
WILMINGTON	0.58	17,651		18,007	10,438
WINCHENDON	0.44	8,805		9,018	3,923 *
WINCHESTER	0.63	20,267		20,204	12,827
WINDSOR	0.44	770		789	343 *
WINTHROP	0.54	18,127		18,233	9,801
WOBURN	0.48	35,943		36,874	17,718
WORCESTER	0.30	169,759		167,559	49,561
WORTHINGTON	0.40	1,156		1,331	530
WRENTHAM	0.41	9,006		9,432	3,889
YARMOUTH	0.44	21,174	31,263	31,673	13,778 *T
TOTALS		6,016,425	329,568	6,187,853	2,863,254

NOTES:

1) (*) 115 cities/towns use .435 coefficient for residential generation per capita rate
2) 236 cities/towns have residential per capita rates calculated from actual generation numbers
3) (T) Communities where tourism has been calculated and included in population number.
4) See Appendices A and L for details of Population Estimates.
5) See Appendix A for details of residental MSW generation rate

APPENDIX E

MASSACHUSETTS COMBUSTION FACILITIES: presents information on the State's combustion facilities' permitted/design daily tonnage, permitted/design yearly tonnage, on-line availability, ash generation and metal recovery for 1992, 1996 and 2000.

APPENDIX E -- Massachusetts Combustion Facilites

1992								
FACILITY	PERMITTED/ DESIGN CAP (TONS/DAY)	MAXIMUM BURN CAP (TONS/YR)	PERCENT ON-LINE AVAIL 1992	PRE-BURN METAL (TONS/YR) RECYCLED	TOTAL MSW BURNED (TONS/YR) 1992	POST-BURN METAL (TONS/YR) RECYCLED	TOTAL ASH GEN (TONS/YR) 1992	TOTAL ASH TO LF AFTER METAL REC (TONS/YR)1992
FALL RIVER - MUNICIPAL	240	52,000	90	NA	52,000	NA	13,000	13,000
HAVERHILL - OGDEN	1650	602,250	91	NA	546,843	11,700	136,711	125,011
LAWRENCE - OGDEN*	712	259,880	75	14,560	180,350	NA	28,856	28,856
MILLBURY - WHEELABRATOR	1500	547,500	95	NA	520,125	2,950	130,031	127,081
N. ANDOVER - NESWC	1500	547,500	92	NA	502,605	10,000	125,651	115,652
PITTSFIELD - VICON**	240	87,600	90	1,018	77,822	NA	19,456	19,456
SAUGUS - RESCO	1500	547,500	90	NA	492,750	19,710	123,188	103,478
SEMASS - ROCHESTER	1800	657,000	89	11,226	570,219	18,093	91,235	73,142
SPRINGFIELD - SRI	360	131,400	91	141	119,433	NA	29,858	29,858
STATEWIDE TOTALS	9,502	3,432,630		26,945	3,062,147	62,453	697,986	635,533

NOTES:

1) *Ogden Lawrence- permitted to process 1050 tpd for rdf, permitted to burn 712 tpd of rdf
2) **Pittsfiled VICON- permitted at 360, burns at 240. Only two of three boilers burn at one time due to inability for facility to meet air quality standards.
3) Fall River operates 260 days per year with max of 1000 tons per week = 52,000 tpy therefore on-line availability not included in calculations.
4) SEMASS brings in 2000 tpd, processes to burn 1800 tpd for 1992.
5) RFD ash calculated on total tons burns x .16 (84% reduction in weight)
6) Mass-burn calculated on total tons burned x .25 (75% reduction in weight)
7) On-line availability estimates obtained from surveys of facilities.

1996 FACILITY	PERMITTED/ DESIGN CAP (TONS/DAY)	MAXIMUM BURN CAP (TONS/YR)	PERCENT ON-LINE AVAIL 1996	PRE-BURN METAL (TONS/YR) RECYCLED	TOTAL MSW BURNED (TONS/YR) 1996	POST-BURN METAL (TONS/YR) RECYCLED	TOTAL ASH GEN (TONS/YR) 1996	TOTAL ASH TO LF AFTER METAL REC (TONS/YR)1996
FALL RIVER - MUNICIPAL	240	52,000	90	0	52,000	0	13,000	13,000
HAVERHILL - OGDEN	1650	602,250	91	0	546,843	11,700	136,711	125,011
LAWRENCE - OGDEN*	712	259,880	75	14,618	180,292	0	28,847	28,847
MILLBURY - WHEELABRATOR	1500	547,500	95	0	520,125	2,950	130,031	127,081
N. ANDOVER - NESWC	1500	547,500	92	0	502,605	10,000	125,651	115,652
PITTSFIELD - VICON**	240	87,600	90	1,018	77,822	0	19,456	19,456
SAUGUS - RESCO	1500	547,500	90	0	492,750	19,710	123,188	103,478
SEMASS - ROCHESTER	2700	985,500	89	16,571	855,596	27,140	136,895	109,756
SHIRLEY - TIRU***	243	88,695	82	0	73,000	0	18,250	18,250
SPRINGFIELD - SRI	360	131,400	91	141	119,433	0	29,858	29,858
STATEWIDE TOTALS	10,645	3,849,825		32,348	3,420,466	71,500	761,887	690,388

NOTES:
1) See Notes on page E-1
2) 1996 and 2000 include data for SEMASS third boiler and the Shirley facility
3) Shirley is permitted to accept 243 TPD with an assumed on-line availability of 82 percent, according to the final permit to construct.

2000 FACILITY	PERMITTED/ DESIGN CAP (TONS/DAY)	MAXIMUM BURN CAP (TONS/YR)	PERCENT ON-LINE AVAIL 2000	PRE-BURN METAL (TONS/YR) RECYCLED	TOTAL MSW BURNED (TONS/YR) 2000	POST-BURN METAL (TONS/YR) RECYCLED	TOTAL ASH GEN (TONS/YR) 2000	TOTAL ASH TO LF AFTER METAL REC (TONS/YR)2000
FALL RIVER - MUNICIPAL	240	52,000	90	0	52,000	0	13,000	13,000
HAVERHILL - OGDEN	1650	602,250	91	0	546,843	11,700	136,711	125,011
LAWRENCE - OGDEN*	712	259,880	75	14,618	180,292	0	28,847	28,847
MILLBURY - WHEELABRATOR	1500	547,500	95	0	520,125	2,950	130,031	127,081
N. ANDOVER - NESWC	1500	547,500	92	0	502,605	10,000	125,651	115,652
PITTSFIELD - VICON**	240	87,600	90	1,018	77,822	0	19,456	19,456
SAUGUS - RESCO	1500	547,500	90	0	492,750	19,710	123,188	103,478
SEMASS - ROCHESTER	2700	985,500	89	16,571	855,596	27,140	136,895	109,756
SHIRLEY - TIRU***	243	88,695	82	0	73,000	0	18,250	18,250
SPRINGFIELD - SRI	360	131,400	91	141	119,433	0	29,858	29,858
STATEWIDE TOTALS	10,645	3,849,825		32,348	3,420,466	71,500	761,887	690,388

NOTES:

1) See Notes on page E-1
2) 1996 and 2000 include data for SEMASS third boiler and the Shirley facility
3) Shirley is permitted to accept 243 TPD with an assumed on-line availability of 82 percent, according to the final permit to construct.

APPENDIX F

MASSACHUSETTS LANDFILLS: presents a summary of the State's landfills, listing the privately owned and municipally owned facilities separately. Each facility accepting MSW and active in 1992 is listed, with their closure or projected closure date, permitted tonnage for 1992, 1996, and 2000. A Statewide summary is also provided.

Appendix F--- Private Landfills Capacity Projections

Town	Est close date or permit end date	Permitted 1992 Tons	Permitted 1996 Tons	Permitted 2000 Tons
ATTLEBORO	1994	93,288	0	0
BARRE	1995	93,600	0	0
CHICOPEE	2011	156,000	156,000	156,000
CHICOPEE-BFI	1993	156,000	0	0
DALTON	1994	13,260	0	0
DARTMOUTH (1)	2000	0	132,600	132,600
E BRIDGEWATER	1996	390,000	390,000	0
FALL RIVER (2)	1997	390,000	390,000	0
GRANBY	1996	124,800	124,800	0
HALIFAX-BFI	1992	140,400	0	0
HARDWICK	1999	21,840	21,840	0
HUDSON	1996	37,440	37,440	0
PEABODY	1995	218,400	0	0
PLAINVILLE (3)	1995	715,000	0	0
RANDOLPH	1995	28,314	0	0
WESTBORO	1994	500	0	0
TOTAL TONS - PRIVATE		2,578,842	1,252,680	288,600
NUMBER OF PRIVATE Lfs		15	7	2

NOTES:

(1) Dartmouth Landfill has received its permit to construct and is expected to be operational by 1996.
(2) Fall River Landfill is permitted to accept 1250 tons/day of MSW and 250 tons per day of Ash.
This table includes only MSW permitted capacity.
(3) Plainville Landfill is permitted operate beyond 1995 in current phases, however, the current permitted portion of the landfill will run out of capacity in late 1995 or early 1996.
This facility is also permitted to accept ash. Approximately 19,000 tons were accepted in 1992.

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Appendix F – 1992 MUNICIPAL LANDFILL SUMMARY

TOWN	EST CLOSE DATE	CAPACITY 1992 TON	1996	2000
ADAMS	1994	10,400	0	0
AGAWAM	1992	34,900	0	0
AMHERST	2000	30,888	30,888	30,888
ASHBURNHAM	1998	4,381	4,381	0
ASHBY	1999	1,560	1,560	0
ATHOL	1993	15,600	0	0
BARNSTABLE	1995	15,288	0	0
BELCHERTOWN	1993	10,400	0	0
BERNARDSTON	1998	4,420	4,420	0
BLACKSTONE	1999	10,192	10,192	0
BOLTON	1998	5,096	5,096	0
BOURNE	1998	36,500	36,500	0
BOXFORD	1998	1,976	1,976	0
BREWSTER	1994	10,192	0	0
BROOKFIELD	1996	12,740	12,740	0
BUCKLAND	1995	4,160	0	0
CARVER	1998	38,500	38,500	0
CHARLTON	1994	7,644	0	0
CHATHAM	1993	12,740	0	0
CHILMARK	1995	5,096	0	0
CLARKSBURG	1999	2,548	2,548	0
COLRAIN	1994	2,600	0	0
CONCORD	1994	16,900	0	0
DARTMOUTH	1995	37,440	0	0
DEERFIELD	1996	7,644	7,644	0
DENNIS	1995	3,900	0	0
DIGHTON	1997	3,900	3,900	0
DUDLEY	1994	5,096	0	0
DUNSTABLE	1992	2,548	0	0
EAST BRIDGEWA	1994	4,056	0	0
EASTHAM	1994	6,800	0	0
EASTHAMPTON	1992	3,000	0	0
EASTON	1998	10,192	10,192	0
EDGARTOWN	1995	1,500	0	0
FAIRHAVEN	1998	11,700	11,700	0
FALMOUTH	1994	12,740	0	0
FOXBOROUGH	1996	15,288	15,288	0
FREETOWN	1995	7,644	0	0
GARDNER	1998	10,192	10,192	0
GAY HEAD	1994	300	0	0
GOSNOLD	1994	322	0	0
GREAT BARRING	1995	10,400	0	0
GREENFIELD	1994	5,200	0	0
HAMPDEN	1994	2,548	0	0
HARWICH	1998	4,188	4,188	0
HINGHAM	1998	10,400	10,400	0
HOLBROOK	1995	8,500	0	0
HOLLAND	1993	900	0	0
HOLLAND	1993	120	0	0
HULL	1994	720	0	0
INGSTON	1995	400	0	0
JEFFEVILLE	1995	5,096	0	0
[illegible]	1994	2,800	0	0
LEVERETT	1993	968	0	0
LONGMEADOW	1990	100	0	0
LOWELL	1992	71,500	0	0
LUDLOW	1993	1,500	0	0
LUNENBURG	1994	6,400	0	0
MARION	1993	2,500	0	0
MARSHFIELD	1996	28,080	28,080	0
MASHPEE	1995	600	0	0
MATTAPOISETT	1996	10,400	10,400	0
MAYFIELD	1993	500	0	0
MERRIMAC	1996	5,200	5,200	0
MIDDLEBOROUG	1998	12,480	12,480	0
MIDDLETON	1995	7,644	0	0
MILTON	1995	15,600	0	0
MONTAGUE	1998	10,816	10,816	0
MONTEREY	1994	15	0	0
NANTUCKET	1998	16,000	16,000	0
NATICK	1992	10	0	0

Appendix F – 1992 MUNICIPAL LANDFILL SUMMARY

TOWN	EST CLOSE DATE	CAPACITY 1992 TON	1996	2000
NEEDHAM	1998	3,500	3,500	0
NEW BEDFORD	1994	156,000	0	0
NEW MARLBORO	1994	15	0	0
NEWBURY	1998	12,825	12,825	0
NORFOLK	1992	4,000	0	0
NORTH ADAMS	1992	10,000	0	0
NORTH ATTLEBO	1997	17,632	17,632	0
NORTH BROOKFI	1995	5,800	0	0
NORTHAMPTON	2004	40,150	40,150	40,150
OAK BLUFFS	1998	2,250	2,250	0
ORANGE	1996	3,072	3,072	0
PALMER	1994	41,600	0	0
PEMBROKE	1993	4,680	0	0
PEPPERELL	1994	4,727	0	0
PLYMOUTH	1995	4,160	0	0
PROVINCETOWN	1994	1,800	0	0
RAYNHAM	1998	10,320	10,320	0
REHOBOTH	1995	1,800	0	0
ROCHESTER	1992	3,120	0	0
ROCKLAND	1998	18,200	18,200	0
ROYALSTON	1998	520	520	0
SALISBURY	1998	10,920	10,920	0
SANDWICH	1989	10	0	0
SCITUATE	1998	10,400	10,400	0
SEEKONK	1993	4,280	0	0
SHIRLEY	1996	832	832	0
SOUTH HADLEY	1995	12,520	0	0
SOUTHAMPTON	1995	2,600	0	0
SOUTHBRIDGE	2000	20,800	20,800	20,800
STURBRIDGE	2000	2,458	2,458	2,458
SUDBURY	1995	7,800	0	0
SUNDERLAND	1993	40	0	0
SUTTON	1995	3,900	0	0
TAUNTON	1994	62,400	0	0
TEMPLETON	1994	3,500	0	0
TISBURY	1995	120	0	0
TOPSFIELD	1995	2,556	0	0
TOWNSEND	1996	15,600	15,600	0
WARE	1996	1,560	1,560	0
WARREN	1998	2,602	2,602	0
WARWICK	1997	600	600	0
WAYLAND	2001	2,340	2,340	2,340
WELLFLEET	1992	500	0	0
WEST BROOKFIE	1996	2,808	2,808	0
WEST TISBURY	1995	70	0	0
WESTFIELD	1995	5,200	0	0
WESTHAMPTON	1999	1,040	1,040	0
WESTMINSTER	1998	156,000	156,000	0
WESTPORT	1995	4,700	0	0
WILBRAHAM	1994	975	0	0
WILLIAMSTOWN	1993	3,500	0	0
WINCHENDON	1998	4,000	4,000	0
YARMOUTH	1995	12,900	0	0
		1,386,270	645,710	96,636

Note: See Appendix A for a discussion of unlined landfills estimated closure dates.

APPENDIX G

MSW DISPOSAL CAPACITY NEED ASSESSMENT SUMMARY: Presents a summary of the projected profiles for the disposal MSW in comparison to permitted solid waste disposal capacity accepting MSW for 1996 and 2000. The profile for 1992 is shown for comparison.

YEAR 1992 28% RECYCLED	MPUF
GROSS MSW GENERATED	6,400,000
TOTAL MSW DIVERTED	1,800,000
MSW NEEDING DISPOSAL	4,600,000
MA MSW EXPORTED	400,000
OUT-OF-STATE MSW DISPOSED IN MA	800,000
DTMW DISPOSED AT MSW CAPACITY	600,000
LANDFILL CAPACITY	* 3,970,000
COMBUSTION CAPACITY	3,100,000
AMOUNT SHORTFALL/(EXCESS)	* (1,470,000)

YEAR 1996 34% RECYCLED	MPUF
GROSS MSW GENERATED	6,750,000
TOTAL MSW DIVERTED	2,295,000
MSW NEEDING DISPOSAL	4,455,000
DTMW DISPOSED AT MSW CAPACITY	675,000
LANDFILL CAPACITY	1,898,390
COMBUSTION CAPACITY	3,420,466
AMOUNT SHORTFALL/(EXCESS)	**(188,856)**

YEAR 2000 46% RECYCLED	MPUF
GROSS MSW GENERATED	6,750,000
TOTAL MSW DIVERTED	3,105,000
MSW NEEDING DISPOSAL	3,645,000
DTMW DISPOSED AT MSW CAPACITY	675,000
LANDFILL CAPACITY	385,236
COMBUSTION CAPACITY	3,420,466
AMOUNT SHORTFALL/(EXCESS)	**514,298**

*DTMW = Difficult to Manage Wastes (including Construction and Demolition Debris, Reycling Residue, and Waste Water Treatment Plant Sludg

NOTES 1) Calculations and Data for 1992 account for imported and exported of MSW. Import and Export figures are not included in calculations for future projections, as one of the goals of the State is to have a net import or export of MSW.

2) Disposal capacity figures are a sum of all of the landfill and combustion facility capacity tonnages. Some disposal facilities are permitted to accept waste types other than MSW, such as Construction and Demolition Debris, and Combustion Ash.

3) The tons of DTMW disposed of in facilities also taking MSW is estimated to be 10% of Gross MSW Generated for that year.

4) Total MSW Diverted refers to that portion of the MSW waste stream that was or is projected to be recycled or composted. Projected diversion rates are based on the Master Plan Goal of 34% by 1996 and 46% by 2000.

5) 1996 landfill capacity does not include the Plainville Landfill (715,000tpy), which may close in late 1995 or early 1996.

APPENDIX H

INTEGRATED SOLID WASTE MANAGEMENT PROJECTIONS: presents estimated residential MSW generation, residential tons recycled, tons needing disposal, disposal location, and contract end date or permit end date for each Massachusetts municipality for the years 1992, 1996, and 2000. A total of MSW generated, recycled, needing disposal, and tons disposed of using that method is also provide for each of the above listed years.

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MUNICIPALITY	RES'L. TONNAGE	RES'L RECYCLE TONS @ 23%	RES'L . BALANCE NEEDING DISPOSAL	1993 DISPOSAL SITE	LF CLOSE OR CON-TRACT END DATE	SPOT DISPOSAL SITE	CAL. YEAR 1992 LOST DISPOSAL CAPACITY	RESIDENTIAL WASTE TO COMBUSTION FACILITIES 1992	RESIDENTIAL WASTE TO COM\REGIONA LANDFILLS 1992	RESIDENTIAL WASTE TO MUNICIPAL LANDFILL 1992	RESIDENTIAL WASTE TO SPOT CONTRACT 1992
Abington	5,992	1,378	4,614	SPOT	1993	MATTAPOISETT	0	0	0	0	4,614
Acton	12,618	2,902	9,716	NESWC	2005		0	9,716	0	0	0
Acushnet	4,165	958	3,207	SEMASS	2013		0	3,207	0	0	0
Adams	3,202	736	2,465	ADAMS	1994		0	0	2,465	0	0
Agawam	9,092	2,091	7,001	SPRINGFIELD	2013		0	7,001	0	0	0
Alford	298	69	229	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	229
Amesbury	6,626	1,524	5,102	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	5,102
Amherst	15,160	3,487	11,673	AMHERST	2000		0	0	11,673	0	0
Andover	14,367	3,304	11,063	NESWC	2005		0	11,063	0	0	0
Arlington	25,566	5,880	19,686	NESWC	2005		0	19,686	0	0	0
Ashburnham	2,465	567	1,898	LOCAL	1998		0	0	0	1,898	0
Ashby	1,292	297	995	LOCAL	1999		0	0	0	995	0
Ashfield	505	116	389	NORTHAMPTON	2004		0	0	389	0	0
Ashland	5,284	1,215	4,069	SPOT	1993	PLAINVILLE	0	0	0	0	4,069
Athol	5,023	1,155	3,868	SPOT	1993		0	0	0	0	3,868
Attleboro	24,099	5,543	18,557	ATTLEBORO	1993		0	0	18,557	0	0
Auburn	6,033	1,388	4,646	MILLBURY	2008		0	4,646	0	0	0
Avon	2,628	604	2,023	E.BRIDGEWATER	1996		0	0	2,023	0	0
Ayer	2,555	588	1,967	OGDEN-HAVERHILL	1997		0	1,967	0	0	0
Barnstable	23,509	5,407	18,102	SEMASS	2016		0	18,102	0	0	0
Barre	3,760	865	2,895	RCI-BARRE	1996		0	0	2,895	0	0
Becket	678	156	522	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	522
Bedford	7,235	1,664	5,571	NESWC	2005		0	5,571	0	0	0
Belchertown	4,861	1,118	3,743	LOCAL	1993		0	0	0	3,743	0
Bellingham	6,607	1,520	5,087	SEMASS	2010		0	5,087	0	0	0
Belmont	15,235	3,504	11,731	NESWC	2005		0	11,731	0	0	0
Berkley	1,630	375	1,255	SPOT	1993	TAUTON	0	0	0	0	1,255
Berlin	1,005	231	774	SPOT	1993	PLAINVILLE	0	0	0	0	774
Bernardston	900	207	693	LOCAL	1998		0	0	0	693	0
Beverly	28,030	6,447	21,583	SAUGUS	2002		0	21,583	0	0	0
Billerica	19,152	4,405	14,747	E.BRIDGEWATER	1996		0	0	14,747	0	0
Blackstone	3,577	823	2,754	LOCAL	1999		0	0	0	2,754	0
Blandford	544	125	419	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	419
Bolton	1,405	323	1,082	LOCAL	1998		0	0	0	1,082	0
Boston		0	0	PLAINVILLE	1995		0	0	0	0	0
Boston		0	0	SPOT	1993	NH	0	0	0	0	0
Boston	252,193	58,004	194,188	E.BRIDGEWATER	1996		0	0	194,188	0	0
Bourne	9,936	2,285	7,651	LOCAL	1998		0	0	0	7,651	0
Boxboro	686	158	528	NESWC	2005		0	528	0	0	0
Boxford	2,754	633	2,121	LOCAL	1998		0	0	0	2,121	0
Boylston	1,682	387	1,295	SPOT	1993	PLAINVILLE	0	0	0	0	1,295
Braintree	18,738	4,310	14,428	SEMASS	2008		0	14,428	0	0	0

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Brewster	6,172	1,420	4,752	SEMASS	2015		0	4,752	0	0	0
Bridgewater	8,312	1,912	6,400	SPOT	1993	E.BRIDGEWATER	0	0	0	0	6,400
Brimfield	652	150	502	PALMER	1994		0	0	502	0	0
Brockton	36,144	8,313	27,831	E.BRIDGEWATER	1996		0	0	27,831	0	0
Brookfield	1,999	460	1,539	LOCAL	1996		0	0	0	1,539	0
Brookline	19,944	4,587	15,357	MAINE	1994		0	0	0	0	15,357
Buckland	868	200	668	LOCAL	1995		0	0	0	668	0
Burlington	11,270	2,592	8,678	NESWC	2005		0	8,678	0	0	0
Cambridge	35,964	8,272	27,693	SPOT	1993	NH	0	0	0	0	27,693
Canton	8,226	1,892	6,334	SEMASS	2015		0	6,334	0	0	0
Carlisle	2,313	532	1,781	NESWC	2005		0	1,781	0	0	0
Carver	9,657	2,221	7,436	SEMASS	2013		0	7,436	0	0	0
Charlemont	569	131	438	GRANBY	1996		0	0	438	0	0
Charlton	5,655	1,301	4,354	LOCAL	1994		0	0	0	4,354	0
Chatham	4,999	1,150	3,849	SEMASS	2016		0	3,849	0	0	0
Chelmsford	16,829	3,871	12,958	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	12,958
Chelsea	15,558	3,578	11,980	SAUGUS	2005		0	11,980	0	0	0
Cheshire	1,060	244	816	GRANBY	1996		0	0	816	0	0
Chester	568	131	437	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	437
Chesterfield	249	57	192	NORTHAMPTON	2004		0	0	192	0	0
Chicopee	35,042	8,060	26,983	CHICOPEE-PARTYKA	2011		0	0	26,983	0	0
Chilmark	848	195	653	SEMASS	2008		0	653	0	0	0
Clarksbrug	1,191	274	917	LOCAL	1999		0	0	0	917	0
Clinton	2,756	634	2,122	RCI-BARRE	1996		0	0	2,122	0	0
Cohasset	3,833	882	2,951	SEMASS	2002		0	2,951	0	0	0
Colrain	518	119	399	LOCAL	1994		0	0	0	399	0
Concord	12,125	2,789	9,336	LOCAL	1994		0	0	0	9,336	0
Conway	417	96	321	GRANBY	1996		0	0	321	0	0
Cummington	442	102	340	NORTHAMPTON	2004		0	0	340	0	0
Dalton	1,561	359	1,202	PITTSFIELD	2006		0	1,202	0	0	0
Danvers	13,024	2,996	10,029	OGDEN-HAVERHILL	1994		0	10,029	0	0	0
Dartmouth	11,935	2,745	9,190	LOCAL	1995		0	0	0	9,190	0
Dedham	9,216	2,120	7,097	PLAINVILLE	1995		0	0	7,097	0	0
Deerfield	2,530	582	1,948	LOCAL	1996		0	0	0	1,948	0
Dennis	12,136	2,791	9,344	SEMASS	2008		0	9,344	0	0	0
Dighton	3,395	781	2,614	LOCAL	1997		0	0	0	2,614	0
Douglas	1,592	366	1,226	SPOT	1993	MILLBURY/BFI-FAL	0	0	0	0	1,226
Dover	2,965	682	2,283	MILLBURY	2007		0	2,283	0	0	0
Dracut	12,665	2,913	9,752	NESWC	2005		0	9,752	0	0	0
Dudley	4,174	960	3,214	LOCAL	1994		0	0	0	3,214	0
Dunstable	1,268	292	976	LOCAL	1993		0	0	0	976	0
Duxbury	8,295	1,908	6,387	E.BRIDGEWATER	1996		0	0	6,387	0	0

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Eastham	4,172	960	3,212	SEMASS	2008		0	3,212	0	0	0
Easthampton	6,197	1,425	4,772	NORTHAMPTON	2004		0	0	4,772	0	0
Easton	9,929	2,284	7,645	LOCAL	1998		0	0	0	7,645	0
Edgartown	4,645	1,068	3,577	SEMASS	2008		0	3,577	0	0	0
Egremont	742	171	571	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	571
Erving	285	66	220	SPOT	1993	GRANBY	0	0	0	0	220
Essex	1,130	260	870	OGDEN-HAVERHILL	2002		0	870	0	0	0
Everett	20,272	4,663	15,609	SAUGUS	1995		0	15,609	0	0	0
E.Bridgewater	4,819	1,108	3,710	E.BRIDGEWATER	1996		0	0	3,710	0	0
E.Brookfield	789	182	608	MILLBURY	2008		0	608	0	0	0
E.Longmeadow	4,963	1,141	3,821	SPRINGFIELD	2013		0	3,821	0	0	0
Fairhaven	11,937	2,746	9,192	SEMASS	2016		0	9,192	0	0	0
Fall River	46,131	10,610	35,521	FALL RIVER	2000		0	0	0	0	0
Falmouth	22,419	5,156	17,263	SEMASS	2008		0	17,263	0	0	0
Fitchburg	17,742	4,081	13,662	WESTMINISTER	1998		0	0	13,662	0	0
Florida	326	75	251	SPOT	1993	UNKNOWN	0	0	0	0	251
Foxborough	5,796	1,333	4,463	LOCAL	1996		0	0	0	4,463	0
Framingham	25,816	5,938	19,878	SPOT	1993	MILLBURY/BFI-FAL	0	0	0	0	19,878
Franklin	9,749	2,242	7,506	MILLBURY	2007		0	7,506	0	0	0
Freetown	3,877	892	2,986	SEMASS	2016		0	2,986	0	0	0
Gardner	7,199	1,656	5,543	LOCAL	1998		0	0	0	5,543	0
Gay Head	189	43	146	SEMASS	2008		0	146	0	0	0
Georgetown	2,838	653	2,185	SPOT	1993	UNKNOWN	0	0	0	0	2,185
Gill	693	159	533	BERNARDSTON	1998		0	0	533	0	0
Gloucester	10,638	2,447	8,191	PEABODY	1995		0	0	8,191	0	0
Goshen	401	92	309	NORTHAMPTON	2004		0	0	309	0	0
Gosnold	37	8	28	SEMASS	1993		0	28	0	0	0
Grafton	4,802	1,105	3,698	MILLBURY	2007		0	3,698	0	0	0
Granby	2,485	572	1,913	GRANBY	1996		0	0	1,913	0	0
Granville	648	149	499	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	499
Greenfield	6,853	1,576	5,277	SPRINGFIELD	2114		0	5,277	0	0	0
Groton	1,997	459	1,538	OGDEN-HAVERHILL	2005		0	1,538	0	0	0
Groveland	2,289	526	1,762	NH	1993		0	0	0	0	1,762
Gt.Barrington	3,320	764	2,556	LOCAL	1995		0	0	0	2,556	0
Hadley	1,629	375	1,254	SPOT	1993	BARRE	0	0	0	0	1,254
Halifax	3,719	855	2,864	SEMASS	1995		0	2,864	0	0	0
Hamilton	3,399	782	2,617	NESWC	2005		0	2,617	0	0	0
Hampden	1,605	369	1,236	LOCAL	1994		0	0	0	1,236	0
Hancock	270	62	208	PITTSFIELD	2006		0	208	0	0	0
Hanover	6,953	1,599	5,354	E.BRIDGEWATER	1996		0	0	5,354	0	0
Hanson	3,985	917	3,068	SEMASS	2009		0	3,068	0	0	0
Hardwick	1,068	246	822	HARDWICK	1993		0	0	822	0	0

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Harvard	5,513	1,268	4,245	SPOT	1993	PLAINVILLE	0	0	0	0	4,245
Harwich	7,178	1,651	5,527	SEMASS	2016		0	5,527	0	0	0
Hatfield	1,413	325	1,088	NORTHAMPTON	2004		0	0	1,088	0	0
Haverhill	25,416	5,846	19,570	OGDEN-HAVERHILL	2002		0	19,570	0	0	0
Hawley	152	35	117	SPOT	1993	NORTHAMPTON	0	0	0	0	117
Heath	234	54	180	SPRINGFIELD	2014		0	180	0	0	0
Hingham	8,557	1,968	6,589	LOCAL	1998		0	0	0	6,589	0
Hinsdale	696	160	536	PITTSFIELD	2006		0	536	0	0	0
Holbrook	4,921	1,132	3,789	LOCAL	1995		0	0	0	3,789	0
Holden	6,001	1,380	4,621	MILLBURY	2007		0	4,621	0	0	0
Holland	1,011	233	779	LOCAL	1993		0	0	0	779	0
Holliston	6,664	1,533	5,131	MILLBURY	2008		0	5,131	0	0	0
Holyoke	13,845	3,184	10,661	GRANBY	1996		0	0	10,661	0	0
Hopedale	1,736	399	1,336	MILLBURY	2008		0	1,336	0	0	0
Hopkinton	4,340	998	3,342	MILLBURY	2009		0	3,342	0	0	0
Hubbardston	1,286	296	990	SPOT	1993	MILLBURY	0	0	0	0	990
Hudson	7,739	1,780	5,959	HUDSON-STOW-REGI	1994		0	0	5,959	0	0
Hull	4,464	1,027	3,437	LOCAL	1994		0	0	0	3,437	0
Huntington	589	135	453	NORTHAMPTON	2004		0	0	453	0	0
Ipswich	6,656	1,531	5,125	SPOT	1993	NESWC	0	0	0	0	5,125
Kingston	4,116	947	3,170	SEMASS	2015		0	3,170	0	0	0
Lakeville	2,830	651	2,179	LOCAL	1995		0	0	0	2,179	0
Lancaster	2,894	666	2,228	SPOT	1993	UNKNOWN	0	0	0	0	2,228
Lanesborough	1,373	316	1,057	PITTSFIELD	2006		0	1,057	0	0	0
Lawrence	28,995	6,669	22,326	OGDEN-HAVERHILL	2002		0	22,326	0	0	0
Lee	3,284	755	2,529	PITTSFIELD	2006		0	2,529	0	0	0
Leicester	4,468	1,028	3,441	SPOT	1993	RCI-BARRE/MILLB	0	0	0	0	3,441
Lenox	1,961	451	1,510	PITTSFIELD	2006		0	1,510	0	0	0
Leominster	16,665	3,833	12,832	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	12,832
Leverett	990	228	762	LOCAL	1993		0	0	0	762	0
Lexington	16,089	3,700	12,388	NESWC	2005		0	12,388	0	0	0
Leyden	314	72	242	BERNARDSTON	1998		0	0	242	0	0
Lincoln	2,918	671	2,247	NESWC	2005		0	2,247	0	0	0
Littleton	3,158	726	2,432	OGDEN-HAVERHILL	2005		0	2,432	0	0	0
Longmeadow	10,405	2,393	8,012	SPRINGFIELD	2014		0	8,012	0	0	0
Lowell	60,183	13,842	46,341	RCI-BARRE	1996		0	0	46,341	0	0
Ludlow	9,163	2,107	7,056	SPRINGFIELD	2011		0	7,056	0	0	0
Lunenburg	6,517	1,499	5,018	LOCAL	1994		0	0	0	5,018	0
Lynn	37,758	8,684	29,074	SAUGUS	1995		0	29,074	0	0	0
Lynnfield	5,419	1,246	4,172	OGDEN-HAVERHILL	2004		0	4,172	0	0	0
Malden	25,261	5,810	19,451	SAUGUS	1995		0	19,451	0	0	0
Manchester	2,846	655	2,192	NESWC	2005		0	2,192	0	0	0

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MUNICIPALITY	RES'L. TONNAGE	RES'L RECYCLE TONS @ 23%	RES'L BALANCE NEEDING DISPOSAL	1993 DISPOSAL SITE	LF CLOSE OR CON-TRACT END DATE	SPOT DISPOSAL SITE	CAL. YEAR 1992 LOST DISPOSAL CAPACITY	RESIDENTIAL WASTE TO COMBUSTION FACILITIES 1992	RESIDENTIAL WASTE TO COM\REGIONA LANDFILLS 1992	RESIDENTIAL WASTE TO MUNICIPAL LANDFILL 1992	RESIDENTIAL WASTE TO SPOT CONTRACT 1992
Mansfield	8,229	1,893	6,337	BFI-FALL RIVER	1997		0	0	6,337	0	0
Marblehead	13,916	3,201	10,715	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	10,715
Marion	3,756	864	2,892	SEMASS	2013		0	2,892	0	0	0
Marlboro	11,585	2,665	8,921	SPOT	1993	SEMASS/MILLBUR	0	0	0	0	8,921
Marshfield	17,472	4,018	13,453	LOCAL	1996		0	0	0	13,453	0
Mashpee	10,965	2,522	8,443	SEMASS	2009		0	8,443	0	0	0
Mattapoisett	2,590	596	1,994	SEMASS	2008		0	1,994	0	0	0
Maynard	3,917	901	3,016	MILLBURY	2008		0	3,016	0	0	0
Medfield	5,329	1,226	4,103	MILLBURY	2008		0	4,103	0	0	0
Medford	29,605	6,809	22,796	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	22,796
Medway	4,571	1,051	3,520	MILLBURY	2008		0	3,520	0	0	0
Melrose	12,666	2,913	9,753	SAUGUS	1995		0	9,753	0	0	0
Mendon	1,711	393	1,317	MILLBURY	2008		0	1,317	0	0	0
Merrimac	2,306	530	1,775	LOCAL	1996		0	0	0	1,775	0
Methuen	17,702	4,072	13,631	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	13,631
Middleborough	12,472	2,869	9,603	SEMASS	2008		0	9,603	0	0	0
Middlefield	184	42	141	NORTHAMPTON	2004		0	0	141	0	0
Middleton	3,562	819	2,743	LOCAL	1995		0	0	0	2,743	0
Milford	8,999	2,070	6,929	MILLBURY	2007		0	6,929	0	0	0
Millbury	5,307	1,221	4,087	MILLBURY	2005		0	4,087	0	0	0
Millis	2,023	465	1,558	MILLBURY	2009		0	1,558	0	0	0
Millville	987	227	760	MILLBURY	2007		0	760	0	0	0
Milton	16,266	3,741	12,525	LOCAL	1995		0	0	0	12,525	0
Monroe	78	18	60	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	60
Monson	3,457	795	2,662	SPOT	1993	CHICOPEE-PARTY	0	0	0	0	2,662
Montague	6,523	1,500	5,023	LOCAL	1998		0	0	0	5,023	0
Monterey	407	94	314	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	314
Montgomery	342	79	263	SPOT	1993	UNKNOWN	0	0	0	0	263
Mt.Washington	76	17	58	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	58
Nahant	2,290	527	1,763	SPOT	1993	SAUGUS	0	0	0	0	1,763
Nantucket	6,774	1,558	5,216	LOCAL	1998		0	0	0	5,216	0
Natick	12,099	2,783	9,317	MILLBURY	2009		0	9,317	0	0	0
Needham	19,538	4,494	15,044	MILLBURY	2008		0	15,044	0	0	0
New Ashford	81	19	62	WILLIAMSTOWM	1993		0	0	62	0	0
New Bedford	42,831	9,851	32,980	LOCAL	1994		0	0	0	32,980	0
New Braintree	327	75	252	SPOT	1993	UNKNOWN	0	0	0	0	252
New Marlboro	586	135	451	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	451
New Salem	324	75	250	ORANGE	1994		0	0	250	0	0
Newbury	2,554	587	1,967	LOCAL	1998		0	0	0	1,967	0
Newburyport	11,637	2,677	8,961	NH	1993		0	0	0	0	8,961
Newton	46,721	10,746	35,975	MILLBURY	2009		0	35,975	0	0	0
Norfolk	4,230	973	3,257	SPOT	1993	PLAINVILLE	0	0	0	0	3,257

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MUNICIPALITY	RES'L. TONNAGE	RES'L RECYCLE TONS @ 23%	RES'L BALANCE NEEDING DISPOSAL	1993 DISPOSAL SITE	LF CLOSE OR CON-TRACT END DATE	SPOT DISPOSAL SITE	CAL. YEAR 1992 LOST DISPOSAL CAPACITY	RESIDENTIAL WASTE TO COMBUSTION FACILITIES 1992	RESIDENTIAL WASTE TO COM\REGIONA LANDFILLS 1992	RESIDENTIAL WASTE TO MUNICIPAL LANDFILL 1992	RESIDENTIAL WASTE TO SPOT CONTRACT 1992
North Adams	6,427	1,478	4,949	SPOT	1993	GRANBY/CHICOPE	0	0	0	0	4,949
North Andover	10,951	2,519	8,432	NESWC	2005		0	8,432	0	0	0
North Reading	8,788	2,021	6,767	NESWC	2005		0	6,767	0	0	0
Northampton	12,690	2,919	9,771	NORTHAMPTON	2004		0	0	9,771	0	0
Northboro	5,814	1,337	4,477	MILLBURY	2008		0	4,477	0	0	0
Northbridge	4,279	984	3,295	MILLBURY	2007		0	3,295	0	0	0
Northfield	1,055	243	812	NH	1993		0	0	0	0	812
Norton	6,284	1,445	4,839	SPOT	1993	UNKNOWN	0	0	0	0	4,839
Norwell	3,198	736	2,463	SEMASS	2016		0	2,463	0	0	0
Norwood	13,023	2,995	10,028	PLAINVILLE	1995		0	0	10,028	0	0
N.Attleboro	9,600	2,208	7,392	LOCAL	1997		0	0	0	7,392	0
N.Brookfield	2,478	570	1,908	LOCAL	1995		0	0	0	1,908	0
Oak Bluff	3,923	902	3,020	SEMASS	2008		0	3,020	0	0	0
Oakham	684	157	527	SPOT	1993	RCI-BARRE/MILLB	0	0	0	0	527
Orange	3,125	719	2,407	ORANGE	1994		0	0	2,407	0	0
Orleans	4,005	921	3,084	SEMASS	2008		0	3,084	0	0	0
Otis	498	114	383	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	383
Oxford	6,525	1,501	5,024	MILLBURY	2005		0	5,024	0	0	0
Palmer	5,346	1,229	4,116	PALMER	1994		0	0	4,116	0	0
Paxton	1,659	381	1,277	MILLBURY	2008		0	1,277	0	0	0
Peabody	20,568	4,731	15,837	NESWC	2005		0	15,837	0	0	0
Pelham	393	90	303	SPOT	1993	AMHERST	0	0	0	0	303
Pembroke	6,445	1,482	4,963	LOCAL	1993		0	0	0	4,963	0
Pepperell	3,208	738	2,470	SPOT	1993	UNKNOWN	0	0	0	0	2,470
Peru	373	86	287	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	287
Petersham	410	94	316	RCI-BARRE	1996		0	0	316	0	0
Phillipston	640	147	493	SPOT	1993		0	0	0	0	493
Pittsfield	19,466	4,477	14,989	PITTSFIELD	2006		0	14,989	0	0	0
Plainfield	139	32	107	NORTHAMPTON	2004		0	0	107	0	0
Plainville	3,039	699	2,340	PLAINVILLE	1995		0	0	2,340	0	0
Plymouth	19,843	4,564	15,279	SEMASS	2006		0	15,279	0	0	0
Plympton	1,098	252	845	SPOT	1993	SEMASS	0	0	0	0	845
Princeton	1,202	277	926	MILLBURY	2008		0	926	0	0	0
Provincetown	3,386	779	2,607	SEMASS	2008		0	2,607	0	0	0
Qunicy	24,660	5,672	18,989	SPOT	1993	E. BRIDGEWATER	0	0	0	0	18,989
Randolph	13,318	3,063	10,255	BFI-RANDOL	1995		0	0	10,255	0	0
Raynham	5,069	1,166	3,903	LOCAL	1998		0	0	0	3,903	0
Reading	11,715	2,694	9,021	SAUGUS	1995		0	9,021	0	0	0
Rehoboth	3,918	901	3,017	LOCAL	1995		0	0	0	3,017	0
Revere	26,488	6,092	20,396	SAUGUS	1995		0	20,396	0	0	0
Richmond	774	178	596	PITTSFIELD	2006		0	596	0	0	0
Rochester	1,815	417	1,397	SEMASS	2016		0	1,397	0	0	0

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Rockland	10,002	2,301	7,702	LOCAL	1998		0	0	0	7,702	0
Rockport	3,974	914	3,060	SAUGUS	2004		0	3,060	0	0	0
Rowe	179	41	138	GRANBY	1996		0	0	138	0	0
Rowley	1,997	459	1,538	SPOT	1993	UNKNOWN	0	0	0	0	1,538
Royalston	525	121	404	LOCAL	1998		0	0	0	404	0
Russell	722	166	556	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	556
Rutland	2,075	477	1,598	MILLBURY	2008		0	1,598	0	0	0
Salem	19,925	4,583	15,342	PLAINVILLE	1995		0	0	15,342	0	0
Salisbury	3,294	758	2,536	OGDEN-HAVERHILL	2000		0	2,536	0	0	0
Sandisfield	342	79	263	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	263
Sandwich	13,561	3,119	10,442	SEMASS	2008		0	10,442	0	0	0
Saugus	15,498	3,565	11,933	SAUGUS	1995		0	11,933	0	0	0
Savoy	307	71	236	ADAMS	1994		0	0	236	0	0
Scituate	11,088	2,550	8,538	LOCAL	1998		0	0	0	8,538	0
Seekonk	3,514	808	2,705	LOCAL	1993		0	0	0	2,705	0
Sharon	7,195	1,655	5,540	SEMASS	2016		0	5,540	0	0	0
Sheffield	1,278	294	984	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	984
Shelburne	429	99	330	PLAINVILLE	1995		0	0	330	0	0
Sherborn	2,009	462	1,547	MILLBURY	2007		0	1,547	0	0	0
Shirley	3,061	704	2,357	LOCAL	1996		0	0	0	2,357	0
Shrewsbury	11,826	2,720	9,106	MILLBURY	2008		0	9,106	0	0	0
Shutesbury	372	86	287	AMHERST	2000		0	0	287	0	0
Somerset	9,190	2,114	7,076	E.BRIDGEWATER	1996		0	0	7,076	0	0
Somerville	34,066	7,835	26,231	SPOT	1993	OGDEN-HAVERHIL	0	0	0	0	26,231
South Hadley	10,553	2,427	8,126	LOCAL	1995		0	0	0	8,126	0
Southampton	2,732	628	2,103	LOCAL	1995		0	0	0	2,103	0
Southboro	10,072	2,317	7,756	MILLBURY	2008		0	7,756	0	0	0
Southbridge	3,441	791	2,650	LOCAL	2000		0	0	0	2,650	0
Southwick	4,462	1,026	3,436	SPRINGFIELD	2011		0	3,436	0	0	0
Spencer	7,456	1,715	5,741	MILLBURY	2008		0	5,741	0	0	0
Springfield	57,547	13,236	44,311	SPRINGFIELD	2012		0	44,311	0	0	0
Sterling	2,553	587	1,966	OGDEN-HAVERHILL	2007		0	1,966	0	0	0
Stockbridge	2,041	469	1,571	SPOT	1993	GRANBY	0	0	0	0	1,571
Stoneham	11,313	2,602	8,711	SAUGUS	1995		0	8,711	0	0	0
Stoughton	10,369	2,385	7,984	SEMASS	2016		0	7,984	0	0	0
Stow	2,832	651	2,181	HUDSON-STOW-REGI	1994		0	0	2,181	0	0
Sturbridge	3,519	809	2,710	LOCAL	2000		0	0	0	2,710	0
Sudbury	6,383	1,468	4,915	LOCAL	1995		0	0	0	4,915	0
Sunderland	1,477	340	1,138	SPOT	1993	UNKNOWN	0	0	0	0	1,138
Sutton	6,246	1,437	4,809	LOCAL	1995		0	0	0	4,809	0
Swampscott	7,851	1,806	6,045	SAUGUS	1994		0	6,045	0	0	0
Swansea	8,188	1,883	6,305	E.BRIDGEWATER	1996		0	0	6,305	0	0

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Taunton	15,862	3,648	12,214	LOCAL	1994		0	0	0	12,214	0
Templeton	3,882	893	2,989	LOCAL	1994		0	0	0	2,989	0
Tewksbury	13,205	3,037	10,168	NESWC	2005		0	10,168	0	0	0
Tisbury	3,329	766	2,563	SEMASS	2008		0	2,563	0	0	0
Tolland	135	31	104	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	104
Topsfield	2,894	666	2,228	LOCAL	1995		0	0	0	2,228	0
Townsend	4,007	922	3,085	LOCAL	1996		0	0	0	3,085	0
Truro	2,441	561	1,879	SEMASS	2008		0	1,879	0	0	0
Tyngsboro	3,791	872	2,919	SPOT	1993	SPRINGFIELD/VIC	0	0	0	0	2,919
Tyringham	87	20	67	PITTSFIELD	2006		0	67	0	0	0
Upton	1,781	410	1,372	MILLBURY	2007		0	1,372	0	0	0
Uxbridge	5,174	1,190	3,984	SPOT	1993	UNKNOWN	0	0	0	0	3,984
Wakefield	14,054	3,232	10,822	SAUGUS	1995		0	10,822	0	0	0
Wales	739	170	569	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	569
Walpole	8,707	2,003	6,705	MILLBURY	2009		0	6,705	0	0	0
Waltham	29,627	6,814	22,813	SEMASS	2010		0	22,813	0	0	0
Ware	2,914	670	2,244	LOCAL	1996		0	0	0	2,244	0
Wareham	8,696	2,000	6,696	SEMASS	2013		0	6,696	0	0	0
Warren	935	215	720	LOCAL	1998		0	0	0	720	0
Warwick	241	55	185	LOCAL	1997		0	0	0	185	0
Washington	132	30	102	PITTSFIELD	2006		0	102	0	0	0
Watertown	17,927	4,123	13,804	NESWC	2005		0	13,804	0	0	0
Wayland	3,569	821	2,748	LOCAL	2001		0	0	0	2,748	0
Webster	7,042	1,620	5,422	SPOT	1993	MILLBURY	0	0	0	0	5,422
Wellesley	17,431	4,009	13,422	PLAINVILLE	1995		0	0	13,422	0	0
Wellfleet	2,887	664	2,223	SEMASS	2011		0	2,223	0	0	0
Wendell	255	59	196	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	196
Wenham	1,465	337	1,128	NESWC	2005		0	1,128	0	0	0
West Newbury	1,672	385	1,288	NESWC	2005		0	1,288	0	0	0
West Tisbury	1,376	316	1,059	SEMASS	2008		0	1,059	0	0	0
Westboro	2,751	633	2,119	MILLBURY	2008		0	2,119	0	0	0
Westfield	16,828	3,870	12,957	LOCAL	1995		0	0	0	12,957	0
Westford	1,815	417	1,397	NESWC	2005		0	1,397	0	0	0
Westhampton	476	109	366	NORTHAMPTON	2004		0	0	366	0	0
Westminster	1,935	445	1,490	WESTMINSTER	1998		0	0	1,490	0	0
Weston	4,847	1,115	3,732	MILLBURY	2008		0	3,732	0	0	0
Westport	12,249	2,817	9,432	LOCAL	1995		0	0	0	9,432	0
Westwood	5,671	1,304	4,366	MILLBURY	2007		0	4,366	0	0	0
Weymouth	19,747	4,542	15,205	E.BRIDGEWATER	1996		0	0	15,205	0	0
Whately	621	143	479	NORTHAMPTON	2004		0	0	479	0	0
Whitman	4,866	1,119	3,747	SPOT	1993	SEMASS	0	0	0	0	3,747
Wilbraham	3,666	843	2,823	SPRINGFIELD	2014		0	2,823	0	0	0

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Williamsburg	1,028	237	792	NORTHAMPTON	2004		0	0	792	0	0
Williamstown	3,527	811	2,716	WILLIAMSTOWN	1993		0	0	2,716	0	0
Wilmington	10,438	2,401	8,037	NESWC	2005		0	8,037	0	0	0
Winchendon	3,923	902	3,021	LOCAL	1998		0	0	0	3,021	0
Winchester	12,827	2,950	9,877	NESWC	2005		0	9,877	0	0	0
Windsor	343	79	264	SPOT	1993	GRANBY/PITTSFIE	0	0	0	0	264
Winthrop	9,801	2,254	7,547	SAUGUS	1995		0	7,547	0	0	0
Woburn	17,718	4,075	13,643	SPOT	1993	PLAINVILLE/SAUG	0	0	0	0	13,643
Worcester	49,561	11,399	38,162	MILLBURY	2008		0	38,162	0	0	0
Worthington	530	122	408	NORTHAMPTON	2004		0	0	408	0	0
Wrentham	3,889	894	2,994	PLAINVILLE	1995		0	0	2,994	0	0
W.Boylston	6,122	1,408	4,714	OGDEN-HAVERHILL	2006		0	4,714	0	0	0
W.Bridgewater	3,126	719	2,407	SEMASS	2009		0	2,407	0	0	0
W.Brookfield	7,837	1,802	6,034	LOCAL	1996		0	0	0	6,034	0
W.Springfield	10,859	2,497	8,361	SPRINGFIELD	2014		0	8,361	0	0	0
W.Stockbridge	645	148	497	SPOT	1993	MILLBURY/PITTSFI	0	0	0	0	497
Yarmouth	13,778	3,169	10,609	SEMASS	2018		0	10,609	0	0	0
TOTALS	2,863,254	675,798	2,262,455	NA	NA	NA	0	1,013,036	539,871	301,833	314,444

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MUNICIPALITY	RES'L. TONNAGE	RES'L RECYCLE TONS @ 34%	RES'L BALANCE NEEDING DISPOSAL	1993 DISPOSAL SITE	LF CLOSE OR CON-TRACT END DATE	SPOT DISPOSAL SITE	CAL. YEAR 1996 LOST DISPOSAL CAPACITY	RESIDENTIAL WASTE TO COMBUSTION FACILITIES 1996	RESIDENTIAL WASTE TO COM\REGIONA LANDFILLS 1996	RESIDENTIAL WASTE TO MUNICIPAL LANDFILL 1996	RESIDENTIAL WASTE TO SPOT CONTRACT 1996
Abington	5,992	2,037	3,955	SPOT	1993	MATTAPOISETT	3,955	0	0	0	3,955
Acton	12,618	4,290	8,328	NESWC	2005		0	8,328	0	0	0
Acushnet	4,165	1,416	2,749	SEMASS	2013		0	2,749	0	0	0
Adams	3,202	1,089	2,113	ADAMS	1994		2,113	0	0	0	0
Agawam	9,092	3,091	6,001	SPRINGFIELD	2013		0	6,001	0	0	0
Alford	298	101	197	SPOT	1993	MILLBURY/PITTSFI	197	0	0	0	197
Amesbury	6,626	2,253	4,373	SPOT	1993	OGDEN-HAVERHIL	4,373	0	0	0	4,373
Amherst	15,160	5,154	10,005	AMHERST	2000		0	0	10,005	0	0
Andover	14,367	4,885	9,482	NESWC	2005		0	9,482	0	0	0
Arlington	25,566	8,692	16,874	NESWC	2005		0	16,874	0	0	0
Ashburnham	2,465	838	1,627	LOCAL	1998		0	0	0	1,627	0
Ashby	1,292	439	853	LOCAL	1999		0	0	0	853	0
Ashfield	505	172	333	NORTHAMPTON	2004		0	0	333	0	0
Ashland	5,284	1,797	3,488	SPOT	1993	PLAINVILLE	3,488	0	0	0	3,488
Athol	5,023	1,708	3,315	SPOT	1993		3,315	0	0	0	3,315
Attleboro	24,099	8,194	15,906	ATTLEBORO	1993		15,906	0	0	0	0
Auburn	6,033	2,051	3,982	MILLBURY	2008		0	3,982	0	0	0
Avon	2,628	893	1,734	E.BRIDGEWATER	1996		0	0	1,734	0	0
Ayer	2,555	869	1,686	OGDEN-HAVERHILL	1997		0	1,686	0	0	0
Barnstable	23,509	7,993	15,516	SEMASS	2016		0	15,516	0	0	0
Barre	3,760	1,278	2,481	RCI-BARRE	1996		0	0	2,481	0	0
Becket	678	231	448	SPOT	1993	MILLBURY/PITTSFI	448	0	0	0	448
Bedford	7,235	2,460	4,775	NESWC	2005		0	4,775	0	0	0
Belchertown	4,861	1,653	3,208	LOCAL	1993		3,208	0	0	0	0
Bellingham	6,607	2,246	4,361	SEMASS	2010		0	4,361	0	0	0
Belmont	15,235	5,180	10,055	NESWC	2005		0	10,055	0	0	0
Berkley	1,630	554	1,076	SPOT	1993	TAUTON	1,076	0	0	0	1,076
Berlin	1,005	342	663	SPOT	1993	PLAINVILLE	663	0	0	0	663
Bernardston	900	306	594	LOCAL	1998		0	0	0	594	0
Beverly	28,030	9,530	18,500	SAUGUS	2002		0	18,500	0	0	0
Billerica	19,152	6,512	12,640	E.BRIDGEWATER	1996		0	0	12,640	0	0
Blackstone	3,577	1,216	2,361	LOCAL	1999		0	0	0	2,361	0
Blandford	544	185	359	SPOT	1993	MILLBURY/PITTSFI	359	0	0	0	359
Bolton	1,405	478	927	LOCAL	1998		0	0	0	927	0
Boston		0	0	PLAINVILLE	1995		0	0	0	0	0
Boston		0	0	SPOT	1993	NH	0	0	0	0	0
Boston	252,193	85,746	166,447	E.BRIDGEWATER	1996		0	0	166,447	0	0
Bourne	9,936	3,378	6,558	LOCAL	1998		0	0	0	6,558	0
Boxboro	686	233	453	NESWC	2005		0	453	0	0	0
Boxford	2,754	936	1,818	LOCAL	1998		0	0	0	1,818	0
Boylston	1,682	572	1,110	SPOT	1993	PLAINVILLE	1,110	0	0	0	1,110
Braintree	18,738	6,371	12,367	SEMASS	2008		0	12,367	0	0	0

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Brewster	6,172	2,098	4,074	SEMASS	2015		0	4,074	0	0	0
Bridgewater	8,312	2,826	5,486	SPOT	1993	E.BRIDGEWATER	5,486	0	0	0	5,486
Brimfield	652	222	431	PALMER	1994		431	0	0	0	0
Brockton	36,144	12,289	23,855	E.BRIDGEWATER	1996		0	0	23,855	0	0
Brookfield	1,999	680	1,320	LOCAL	1996		0	0	0	1,320	0
Brookline	19,944	6,781	13,163	MAINE	1994		13,163	0	0	0	13,163
Buckland	868	295	573	LOCAL	1995		573	0	0	0	0
Burlington	11,270	3,832	7,438	NESWC	2005		0	7,438	0	0	0
Cambridge	35,964	12,228	23,737	SPOT	1993	NH	23,737	0	0	0	23,737
Canton	8,226	2,797	5,429	SEMASS	2015		0	5,429	0	0	0
Carlisle	2,313	786	1,526	NESWC	2005		0	1,526	0	0	0
Carver	9,657	3,283	6,373	SEMASS	2013		0	6,373	0	0	0
Charlemont	569	193	375	GRANBY	1996		0	0	375	0	0
Charlton	5,655	1,923	3,732	LOCAL	1994		3,732	0	0	0	0
Chatham	4,999	1,700	3,299	SEMASS	2016		0	3,299	0	0	0
Chelmsford	16,829	5,722	11,107	SPOT	1993	OGDEN-HAVERHIL	11,107	0	0	0	11,107
Chelsea	15,558	5,290	10,268	SAUGUS	2005		0	10,268	0	0	0
Cheshire	1,060	360	700	GRANBY	1996		0	0	700	0	0
Chester	568	193	375	SPOT	1993	MILLBURY/PITTSFI	375	0	0	0	375
Chesterfield	249	85	164	NORTHAMPTON	2004		0	0	164	0	0
Chicopee	35,042	11,914	23,128	CHICOPEE-PARTYKA	2011		0	0	23,128	0	0
Chilmark	848	288	560	SEMASS	2008		0	560	0	0	0
Clarksbrug	1,191	405	786	LOCAL	1999		0	0	0	786	0
Clinton	2,756	937	1,819	RCI-BARRE	1996		0	0	1,819	0	0
Cohasset	3,833	1,303	2,530	SEMASS	2002		0	2,530	0	0	0
Colrain	518	176	342	LOCAL	1994		342	0	0	0	0
Concord	12,125	4,123	8,003	LOCAL	1994		8,003	0	0	0	0
Conway	417	142	275	GRANBY	1996		0	0	275	0	0
Cummington	442	150	292	NORTHAMPTON	2004		0	0	292	0	0
Dalton	1,561	531	1,030	PITTSFIELD	2006		0	1,030	0	0	0
Danvers	13,024	4,428	8,596	OGDEN-HAVERHILL	1994		8,596	0	0	0	0
Dartmouth	11,935	4,058	7,877	LOCAL	1995		7,877	0	0	0	0
Dedham	9,216	3,134	6,083	PLAINVILLE	1995		6,083	0	0	0	0
Deerfield	2,530	860	1,670	LOCAL	1996		0	0	0	1,670	0
Dennis	12,136	4,126	8,010	SEMASS	2008		0	8,010	0	0	0
Dighton	3,395	1,154	2,241	LOCAL	1997		0	0	0	2,241	0
Douglas	1,592	541	1,051	SPOT	1993	MILLBURY/BFI-FAL	1,051	0	0	0	1,051
Dover	2,965	1,008	1,957	MILLBURY	2007		0	1,957	0	0	0
Dracut	12,665	4,306	8,359	NESWC	2005		0	8,359	0	0	0
Dudley	4,174	1,419	2,755	LOCAL	1994		2,755	0	0	0	0
Dunstable	1,268	431	837	LOCAL	1993		837	0	0	0	0
Duxbury	8,295	2,820	5,475	E.BRIDGEWATER	1996		0	0	5,475	0	0

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Eastham	4,172	1,418	2,754	SEMASS	2008		0	2,754	0	0	0
Easthampton	6,197	2,107	4,090	NORTHAMPTON	2004		0	0	4,090	0	0
Easton	9,929	3,376	6,553	LOCAL	1998		0	0	0	6,553	0
Edgartown	4,645	1,579	3,066	SEMASS	2008		0	3,066	0	0	0
Egremont	742	252	490	SPOT	1993	GRANBY/PITTSFIE	490	0	0	0	490
Erving	285	97	188	SPOT	1993	GRANBY	188	0	0	0	188
Essex	1,130	384	746	OGDEN-HAVERHILL	2002		0	746	0	0	0
Everett	20,272	6,892	13,379	SAUGUS	1995		13,379	0	0	0	0
E.Bridgewater	4,819	1,638	3,180	E BRIDGEWATER	1996		0	0	3,180	0	0
E.Brookfield	789	268	521	MILLBURY	2008		0	521	0	0	0
E.Longmeadow	4,963	1,687	3,275	SPRINGFIELD	2013		0	3,275	0	0	0
Fairhaven	11,937	4,059	7,878	SEMASS	2016		0	7,878	0	0	0
Fall River	46,131	15,685	30,447	FALL RIVER	2000		0	0	0	0	0
Falmouth	22,419	7,623	14,797	SEMASS	2008		0	14,797	0	0	0
Fitchburg	17,742	6,032	11,710	WESTMINISTER	1998		0	0	11,710	0	0
Florida	326	111	215	SPOT	1993	UNKNOWN	215	0	0	0	215
Foxborough	5,796	1,970	3,825	LOCAL	1996		0	0	0	3,825	0
Framingham	25,816	8,777	17,038	SPOT	1993	MILLBURY/BFI-FAL	17,038	0	0	0	17,038
Franklin	9,749	3,315	6,434	MILLBURY	2007		0	6,434	0	0	0
Freetown	3,877	1,318	2,559	SEMASS	2016		0	2,559	0	0	0
Gardner	7,199	2,448	4,752	LOCAL	1998		0	0	0	4,752	0
Gay Head	189	64	125	SEMASS	2008		0	125	0	0	0
Georgetown	2,838	965	1,873	SPOT	1993	UNKNOWN	1,873	0	0	0	1,873
Gill	693	236	457	BERNARDSTON	1998		0	0	457	0	0
Gloucester	10,638	3,617	7,021	PEABODY	1995		7,021	0	0	0	0
Goshen	401	136	265	NORTHAMPTON	2004		0	0	265	0	0
Gosnold	37	12	24	SEMASS	1993		24	0	0	0	0
Grafton	4,802	1,633	3,170	MILLBURY	2007		0	3,170	0	0	0
Granby	2,485	845	1,640	GRANBY	1996		0	0	1,640	0	0
Granville	648	220	428	SPOT	1993	MILLBURY/PITTSFI	428	0	0	0	428
Greenfield	6,853	2,330	4,523	SPRINGFIELD	2114		0	4,523	0	0	0
Groton	1,997	679	1,318	OGDEN-HAVERHILL	2005		0	1,318	0	0	0
Groveland	2,289	778	1,510	NH	1993		1,510	0	0	0	1,510
Gt.Barrington	3,320	1,129	2,191	LOCAL	1995		2,191	0	0	0	0
Hadley	1,629	554	1,075	SPOT	1993	BARRE	1,075	0	0	0	1,075
Halifax	3,719	1,264	2,454	SEMASS	1995		2,454	0	0	0	0
Hamilton	3,399	1,156	2,243	NESWC	2005		0	2,243	0	0	0
Hampden	1,605	546	1,059	LOCAL	1994		1,059	0	0	0	0
Hancock	270	92	179	PITTSFIELD	2006		0	179	0	0	0
Hanover	6,953	2,364	4,589	E.BRIDGEWATER	1996		0	0	4,589	0	0
Hanson	3,985	1,355	2,630	SEMASS	2009		0	2,630	0	0	0
Hardwick	1,068	363	705	HARDWICK	1993		705	0	0	0	0

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Harvard	5,513	1,874	3,639	SPOT	1993	PLAINVILLE	3,639	0	0	0	3,639
Harwich	7,178	2,441	4,738	SEMASS	2016		0	4,738	0	0	0
Hatfield	1,413	480	932	NORTHAMPTON	2004		0	0	932	0	0
Haverhill	25,416	8,641	16,774	OGDEN-HAVERHILL	2002		0	16,774	0	0	0
Hawley	152	52	100	SPOT	1993	NORTHAMPTON	100	0	0	0	100
Heath	234	80	154	SPRINGFIELD	2014		0	154	0	0	0
Hingham	8,557	2,909	5,648	LOCAL	1998		0	0	0	5,648	0
Hinsdale	696	236	459	PITTSFIELD	2006		0	459	0	0	0
Holbrook	4,921	1,673	3,248	LOCAL	1995		3,248	0	0	0	0
Holden	6,001	2,040	3,960	MILLBURY	2007		0	3,960	0	0	0
Holland	1,011	344	667	LOCAL	1993		667	0	0	0	0
Holliston	6,664	2,266	4,398	MILLBURY	2008		0	4,398	0	0	0
Holyoke	13,845	4,707	9,138	GRANBY	1996		0	0	9,138	0	0
Hopedale	1,736	590	1,146	MILLBURY	2008		0	1,146	0	0	0
Hopkinton	4,340	1,476	2,864	MILLBURY	2009		0	2,864	0	0	0
Hubbardston	1,286	437	848	SPOT	1993	MILLBURY	848	0	0	0	848
Hudson	7,739	2,631	5,108	HUDSON-STOW-REGI	1994		5,108	0	0	0	0
Hull	4,464	1,518	2,946	LOCAL	1994		2,946	0	0	0	0
Huntington	589	200	389	NORTHAMPTON	2004		0	0	389	0	0
Ipswich	6,656	2,263	4,393	SPOT	1993	NESWC	4,393	0	0	0	4,393
Kingston	4,116	1,400	2,717	SEMASS	2015		0	2,717	0	0	0
Lakeville	2,830	962	1,868	LOCAL	1995		1,868	0	0	0	0
Lancaster	2,894	984	1,910	SPOT	1993	UNKNOWN	1,910	0	0	0	1,910
Lanesborough	1,373	467	906	PITTSFIELD	2006		0	906	0	0	0
Lawrence	28,995	9,858	19,136	OGDEN-HAVERHILL	2002		0	19,136	0	0	0
Lee	3,284	1,117	2,167	PITTSFIELD	2006		0	2,167	0	0	0
Leicester	4,468	1,519	2,949	SPOT	1993	RCI-BARRE/MILLB	2,949	0	0	0	2,949
Lenox	1,961	667	1,294	PITTSFIELD	2006		0	1,294	0	0	0
Leominster	16,665	5,666	10,999	SPOT	1993	OGDEN-HAVERHIL	10,999	0	0	0	10,999
Leverett	990	337	654	LOCAL	1993		654	0	0	0	0
Lexington	16,089	5,470	10,619	NESWC	2005		0	10,619	0	0	0
Leyden	314	107	207	BERNARDSTON	1998		0	0	207	0	0
Lincoln	2,918	992	1,926	NESWC	2005		0	1,926	0	0	0
Littleton	3,158	1,074	2,084	OGDEN-HAVERHILL	2005		0	2,084	0	0	0
Longmeadow	10,405	3,538	6,867	SPRINGFIELD	2014		0	6,867	0	0	0
Lowell	60,183	20,462	39,721	RCI-BARRE	1996		0	0	39,721	0	0
Ludlow	9,163	3,115	6,048	SPRINGFIELD	2011		0	6,048	0	0	0
Lunenburg	6,517	2,216	4,301	LOCAL	1994		4,301	0	0	0	0
Lynn	37,758	12,838	24,920	SAUGUS	1995		24,920	0	0	0	0
Lynnfield	5,419	1,842	3,576	OGDEN-HAVERHILL	2004		0	3,576	0	0	0
Malden	25,261	8,589	16,672	SAUGUS	1995		16,672	0	0	0	0
Manchester	2,846	968	1,879	NESWC	2005		0	1,879	0	0	0

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Mansfield	8,229	2,798	5,431	BFI-FALL RIVER	1997		0	0	5,431	0	0
Marblehead	13,916	4,731	9,185	SPOT	1993	OGDEN-HAVERHIL	9,185	0	0	0	9,185
Marion	3,756	1,277	2,479	SEMASS	2013		0	2,479	0	0	0
Marlboro	11,585	3,939	7,646	SPOT	1993	SEMASS/MILLBUR	7,646	0	0	0	7,646
Marshfield	17,472	5,940	11,531	LOCAL	1996		0	0	0	11,531	0
Mashpee	10,965	3,728	7,237	SEMASS	2009		0	7,237	0	0	0
Mattapoisett	2,590	881	1,709	SEMASS	2008		0	1,709	0	0	0
Maynard	3,917	1,332	2,586	MILLBURY	2008		0	2,586	0	0	0
Medfield	5,329	1,812	3,517	MILLBURY	2008		0	3,517	0	0	0
Medford	29,605	10,066	19,539	SPOT	1993	OGDEN-HAVERHIL	19,539	0	0	0	19,539
Medway	4,571	1,554	3,017	MILLBURY	2008		0	3,017	0	0	0
Melrose	12,666	4,307	8,360	SAUGUS	1995		8,360	0	0	0	0
Mendon	1,711	582	1,129	MILLBURY	2008		0	1,129	0	0	0
Merrimac	2,306	784	1,522	LOCAL	1996		0	0	0	1,522	0
Methuen	17,702	6,019	11,684	SPOT	1993	OGDEN-HAVERHIL	11,684	0	0	0	11,684
Middleborough	12,472	4,240	8,232	SEMASS	2008		0	8,232	0	0	0
Middlefield	184	62	121	NORTHAMPTON	2004		0	0	121	0	0
Middleton	3,562	1,211	2,351	LOCAL	1995		2,351	0	0	0	0
Milford	8,999	3,059	5,939	MILLBURY	2007		0	5,939	0	0	0
Millbury	5,307	1,805	3,503	MILLBURY	2005		0	3,503	0	0	0
Millis	2,023	688	1,335	MILLBURY	2009		0	1,335	0	0	0
Millville	987	336	652	MILLBURY	2007		0	652	0	0	0
Milton	16,266	5,530	10,735	LOCAL	1995		10,735	0	0	0	0
Monroe	78	26	51	SPOT	1993	GRANBY/PITTSFIE	51	0	0	0	51
Monson	3,457	1,175	2,281	SPOT	1993	CHICOPEE-PARTY	2,281	0	0	0	2,281
Montague	6,523	2,218	4,305	LOCAL	1998		0	0	0	4,305	0
Monterey	407	139	269	SPOT	1993	GRANBY/PITTSFIE	269	0	0	0	269
Montgomery	342	116	226	SPOT	1993	UNKNOWN	226	0	0	0	226
Mt.Washington	76	26	50	SPOT	1993	MILLBURY/PITTSFI	50	0	0	0	50
Nahant	2,290	779	1,511	SPOT	1993	SAUGUS	1,511	0	0	0	1,511
Nantucket	6,774	2,303	4,471	LOCAL	1998		0	0	0	4,471	0
Natick	12,099	4,114	7,986	MILLBURY	2009		0	7,986	0	0	0
Needham	19,538	6,643	12,895	MILLBURY	2008		0	12,895	0	0	0
New Ashford	81	27	53	WILLIAMSTOWM	1993		53	0	0	0	0
New Bedford	42,831	14,563	28,269	LOCAL	1994		28,269	0	0	0	0
New Braintree	327	111	216	SPOT	1993	UNKNOWN	216	0	0	0	216
New Marlboro	586	199	387	SPOT	1993	GRANBY/PITTSFIE	387	0	0	0	387
New Salem	324	110	214	ORANGE	1994		214	0	0	0	0
Newbury	2,554	868	1,686	LOCAL	1998		0	0	0	1,686	0
Newburyport	11,637	3,957	7,681	NH	1993		7,681	0	0	0	7,681
Newton	46,721	15,885	30,836	MILLBURY	2009		0	30,836	0	0	0
Norfolk	4,230	1,438	2,792	SPOT	1993	PLAINVILLE	2,792	0	0	0	2,792

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North Adams	6,427	2,185	4,242	SPOT	1993	GRANBY/CHICOPE	4,242	0	0	0	4,242
North Andover	10,951	3,723	7,228	NESWC	2005		0	7,228	0	0	0
North Reading	8,788	2,988	5,800	NESWC	2005		0	5,800	0	0	0
Northampton	12,690	4,315	8,375	NORTHAMPTON	2004		0	0	8,375	0	0
Northboro	5,814	1,977	3,837	MILLBURY	2008		0	3,837	0	0	0
Northbridge	4,279	1,455	2,824	MILLBURY	2007		0	2,824	0	0	0
Northfield	1,055	359	696	NH	1993		696	0	0	0	696
Norton	6,284	2,137	4,147	SPOT	1993	UNKNOWN	4,147	0	0	0	4,147
Norwell	3,198	1,087	2,111	SEMASS	2016		0	2,111	0	0	0
Norwood	13,023	4,428	8,595	PLAINVILLE	1995		8,595	0	0	0	0
N.Attleboro	9,600	3,264	6,336	LOCAL	1997		0	0	0	6,336	0
N.Brookfield	2,478	843	1,636	LOCAL	1995		1,636	0	0	0	0
Oak Bluff	3,923	1,334	2,589	SEMASS	2008		0	2,589	0	0	0
Oakham	684	233	452	SPOT	1993	RCI-BARRE/MILLB	452	0	0	0	452
Orange	3,125	1,063	2,063	ORANGE	1994		2,063	0	0	0	0
Orleans	4,005	1,362	2,643	SEMASS	2008		0	2,643	0	0	0
Otis	498	169	329	SPOT	1993	MILLBURY/PITTSFI	329	0	0	0	329
Oxford	6,525	2,219	4,307	MILLBURY	2005		0	4,307	0	0	0
Palmer	5,346	1,818	3,528	PALMER	1994		3,528	0	0	0	0
Paxton	1,659	564	1,095	MILLBURY	2008		0	1,095	0	0	0
Peabody	20,568	6,993	13,575	NESWC	2005		0	13,575	0	0	0
Pelham	393	134	259	SPOT	1993	AMHERST	259	0	0	0	259
Pembroke	6,445	2,191	4,254	LOCAL	1993		4,254	0	0	0	0
Pepperell	3,208	1,091	2,117	SPOT	1993	UNKNOWN	2,117	0	0	0	2,117
Peru	373	127	246	SPOT	1993	GRANBY/PITTSFIE	246	0	0	0	246
Petersham	410	139	271	RCI-BARRE	1996		0	0	271	0	0
Phillipston	640	218	422	SPOT	1993		422	0	0	0	422
Pittsfield	19,466	6,619	12,848	PITTSFIELD	2006		0	12,848	0	0	0
Plainfield	139	47	92	NORTHAMPTON	2004		0	0	92	0	0
Plainville	3,039	1,033	2,006	PLAINVILLE	1995		2,006	0	0	0	0
Plymouth	19,843	6,747	13,097	SEMASS	2006		0	13,097	0	0	0
Plympton	1,098	373	724	SPOT	1993	SEMASS	724	0	0	0	724
Princeton	1,202	409	794	MILLBURY	2008		0	794	0	0	0
Provincetown	3,386	1,151	2,235	SEMASS	2008		0	2,235	0	0	0
Qunicy	24,660	8,385	16,276	SPOT	1993	E. BRIDGEWATER	16,276	0	0	0	16,276
Randolph	13,318	4,528	8,790	BFI-RANDOL	1995		8,790	0	0	0	0
Raynham	5,069	1,723	3,346	LOCAL	1998		0	0	0	3,346	0
Reading	11,715	3,983	7,732	SAUGUS	1995		7,732	0	0	0	0
Rehoboth	3,918	1,332	2,586	LOCAL	1995		2,586	0	0	0	0
Revere	26,488	9,006	17,482	SAUGUS	1995		17,482	0	0	0	0
Richmond	774	263	511	PITTSFIELD	2006		0	511	0	0	0
Rochester	1,815	617	1,198	SEMASS	2016		0	1,198	0	0	0

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Rockland	10,002	3,401	6,602	LOCAL	1998		0	0	0	6,602	0
Rockport	3,974	1,351	2,623	SAUGUS	2004		0	2,623	0	0	0
Rowe	179	61	118	GRANBY	1996		0	0	118	0	0
Rowley	1,997	679	1,318	SPOT	1993	UNKNOWN	1,318	0	0	0	1,318
Royalston	525	179	347	LOCAL	1998		0	0	0	347	0
Russell	722	246	477	SPOT	1993	MILLBURY/PITTSFI	477	0	0	0	477
Rutland	2,075	705	1,369	MILLBURY	2008		0	1,369	0	0	0
Salem	19,925	6,774	13,150	PLAINVILLE	1995		13,150	0	0	0	0
Salisbury	3,294	1,120	2,174	OGDEN-HAVERHILL	2000		0	2,174	0	0	0
Sandisfield	342	116	226	SPOT	1993	MILLBURY/PITTSFI	226	0	0	0	226
Sandwich	13,561	4,611	8,950	SEMASS	2008		0	8,950	0	0	0
Saugus	15,498	5,269	10,229	SAUGUS	1995		10,229	0	0	0	0
Savoy	307	104	203	ADAMS	1994		203	0	0	0	0
Scituate	11,088	3,770	7,318	LOCAL	1998		0	0	0	7,318	0
Seekonk	3,514	1,195	2,319	LOCAL	1993		2,319	0	0	0	0
Sharon	7,195	2,446	4,748	SEMASS	2016		0	4,748	0	0	0
Sheffield	1,278	434	843	SPOT	1993	GRANBY/PITTSFIE	843	0	0	0	843
Shelburne	429	146	283	PLAINVILLE	1995		283	0	0	0	0
Sherborn	2,009	683	1,326	MILLBURY	2007		0	1,326	0	0	0
Shirley	3,061	1,041	2,020	LOCAL	1996		0	0	0	2,020	0
Shrewsbury.	11,826	4,021	7,805	MILLBURY	2008		0	7,805	0	0	0
Shutesbury	372	127	246	AMHERST	2000		0	0	246	0	0
Somerset	9,190	3,125	6,065	E.BRIDGEWATER	1996		0	0	6,065	0	0
Somerville	34,066	11,583	22,484	SPOT	1993	OGDEN-HAVERHIL	22,484	0	0	0	22,484
South Hadley	10,553	3,588	6,965	LOCAL	1995		6,965	0	0	0	0
Southampton	2,732	929	1,803	LOCAL	1995		1,803	0	0	0	0
Southboro	10,072	3,425	6,648	MILLBURY	2008		0	6,648	0	0	0
Southbridge	3,441	1,170	2,271	LOCAL	2000		0	0	0	2,271	0
Southwick	4,462	1,517	2,945	SPRINGFIELD	2011		0	2,945	0	0	0
Spencer	7,456	2,535	4,921	MILLBURY	2008		0	4,921	0	0	0
Springfield	57,547	19,566	37,981	SPRINGFIELD	2012		0	37,981	0	0	0
Sterling	2,553	868	1,685	OGDEN-HAVERHILL	2007		0	1,685	0	0	0
Stockbridge	2,041	694	1,347	SPOT	1993	GRANBY	1,347	0	0	0	1,347
Stoneham	11,313	3,846	7,467	SAUGUS	1995		7,467	0	0	0	0
Stoughton	10,369	3,525	6,843	SEMASS	2016		0	6,843	0	0	0
Stow	2,832	963	1,869	HUDSON-STOW-REGI	1994		1,869	0	0	0	0
Sturbridge	3,519	1,197	2,323	LOCAL	2000		0	0	0	2,323	0
Sudbury	6,383	2,170	4,213	LOCAL	1995		4,213	0	0	0	0
Sunderland	1,477	502	975	SPOT	1993	UNKNOWN	975	0	0	0	975
Sutton	6,246	2,124	4,122	LOCAL	1995		4,122	0	0	0	0
Swampscott	7,851	2,669	5,181	SAUGUS	1994		5,181	0	0	0	0
Swansea	8,188	2,784	5,404	E.BRIDGEWATER	1996		0	0	5,404	0	0

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Taunton	15,862	5,393	10,469	LOCAL	1994		10,469	0	0	0	0
Templeton	3,882	1,320	2,562	LOCAL	1994		2,562	0	0	0	0
Tewksbury	13,205	4,490	8,715	NESWC	2005		0	8,715	0	0	0
Tisbury	3,329	1,132	2,197	SEMASS	2008		0	2,197	0	0	0
Tolland	135	46	89	SPOT	1993	MILLBURY/PITTSFI	89	0	0	0	89
Topsfield	2,894	984	1,910	LOCAL	1995		1,910	0	0	0	0
Townsend	4,007	1,362	2,644	LOCAL	1996		0	0	0	2,644	0
Truro	2,441	830	1,611	SEMASS	2008		0	1,611	0	0	0
Tyngsboro	3,791	1,289	2,502	SPOT	1993	SPRINGFIELD/VIC	2,502	0	0	0	2,502
Tyringham	87	30	57	PITTSFIELD	2006		0	57	0	0	0
Upton	1,781	606	1,176	MILLBURY	2007		0	1,176	0	0	0
Uxbridge	5,174	1,759	3,415	SPOT	1993	UNKNOWN	3,415	0	0	0	3,415
Wakefield	14,054	4,778	9,276	SAUGUS	1995		9,276	0	0	0	0
Wales	739	251	488	SPOT	1993	MILLBURY/PITTSFI	488	0	0	0	488
Walpole	8,707	2,960	5,747	MILLBURY	2009		0	5,747	0	0	0
Waltham	29,627	10,073	19,554	SEMASS	2010		0	19,554	0	0	0
Ware	2,914	991	1,924	LOCAL	1996		0	0	0	1,924	0
Wareham	8,696	2,957	5,739	SEMASS	2013		0	5,739	0	0	0
Warren	935	318	617	LOCAL	1998		0	0	0	617	0
Warwick	241	82	159	LOCAL	1997		0	0	0	159	0
Washington	132	45	87	PITTSFIELD	2006		0	87	0	0	0
Watertown	17,927	6,095	11,832	NESWC	2005		0	11,832	0	0	0
Wayland	3,569	1,213	2,355	LOCAL	2001		0	0	0	2,355	0
Webster	7,042	2,394	4,648	SPOT	1993	MILLBURY	4,648	0	0	0	4,648
Wellesley	17,431	5,926	11,504	PLAINVILLE	1995		11,504	0	0	0	0
Wellfleet	2,887	981	1,905	SEMASS	2011		0	1,905	0	0	0
Wendell	255	87	168	SPOT	1993	MILLBURY/PITTSFI	168	0	0	0	168
Wenham	1,465	498	967	NESWC	2005		0	967	0	0	0
West Newbury	1,672	569	1,104	NESWC	2005		0	1,104	0	0	0
West Tisbury	1,376	468	908	SEMASS	2008		0	908	0	0	0
Westboro	2,751	935	1,816	MILLBURY	2008		0	1,816	0	0	0
Westfield	16,828	5,721	11,106	LOCAL	1995		11,106	0	0	0	0
Westford	1,815	617	1,198	NESWC	2005		0	1,198	0	0	0
Westhampton	476	162	314	NORTHAMPTON	2004		0	0	314	0	0
Westminster	1,935	658	1,277	WESTMINSTER	1998		0	0	1,277	0	0
Weston	4,847	1,648	3,199	MILLBURY	2008		0	3,199	0	0	0
Westport	12,249	4,165	8,084	LOCAL	1995		8,084	0	0	0	0
Westwood	5,671	1,928	3,743	MILLBURY	2007		0	3,743	0	0	0
Weymouth	19,747	6,714	13,033	E.BRIDGEWATER	1996		0	0	13,033	0	0
Whately	621	211	410	NORTHAMPTON	2004		0	0	410	0	0
Whitman	4,866	1,654	3,211	SPOT	1993	SEMASS	3,211	0	0	0	3,211
Wilbraham	3,666	1,247	2,420	SPRINGFIELD	2014		0	2,420	0	0	0

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Williamsburg	1,028	350	679	NORTHAMPTON	2004		0	0	679	0	0
Williamstown	3,527	1,199	2,328	WILLIAMSTOWN	1993		2,328	0	0	0	0
Wilmington	10,438	3,549	6,889	NESWC	2005		0	6,889	0	0	0
Winchendon	3,923	1,334	2,589	LOCAL	1998		0	0	0	2,589	0
Winchester	12,827	4,361	8,466	NESWC	2005		0	8,466	0	0	0
Windsor	343	117	227	SPOT	1993	GRANBY/PITTSFIE	227	0	0	0	227
Winthrop	9,801	3,332	6,469	SAUGUS	1995		6,469	0	0	0	0
Woburn	17,718	6,024	11,694	SPOT	1993	PLAINVILLE/SAUG	11,694	0	0	0	11,694
Worcester	49,561	16,851	32,710	MILLBURY	2008		0	32,710	0	0	0
Worthington	530	180	350	NORTHAMPTON	2004		0	0	350	0	0
Wrentham	3,889	1,322	2,566	PLAINVILLE	1995		2,566	0	0	0	0
W.Boylston	6,122	2,082	4,041	OGDEN-HAVERHILL	2006		0	4,041	0	0	0
W.Bridgewater	3,126	1,063	2,063	SEMASS	2009		0	2,063	0	0	0
W.Brookfield	7,837	2,664	5,172	LOCAL	1996		0	0	0	5,172	0
W.Springfield	10,859	3,692	7,167	SPRINGFIELD	2014		0	7,167	0	0	0
W.Stockbridge	645	219	426	SPOT	1993	MILLBURY/PITTSFI	426	0	0	0	426
Yarmouth	13,778	4,684	9,093	SEMASS	2018		0	9,093	0	0	0
TOTALS	2,863,254	999,006	1,939,247	NA	NA	NA	649,929	730,075	368,228	111,069	269,523

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Abington	5,992	2,756	3,236	SPOT	1993	MATTAPOISETT	3,236	0	0	0	3,236
Acton	12,618	5,804	6,814	NESWC	2005		0	6,814	0	0	0
Acushnet	4,165	1,916	2,249	SEMASS	2013		0	2,249	0	0	0
Adams	3,202	1,473	1,729	ADAMS	1994		1,729	0	0	0	0
Agawam	9,092	4,182	4,910	SPRINGFIELD	2013		0	4,910	0	0	0
Alford	298	137	161	SPOT	1993	MILLBURY/PITTSFI	161	0	0	0	161
Amesbury	6,626	3,048	3,578	SPOT	1993	OGDEN-HAVERHIL	3,578	0	0	0	3,578
Amherst	15,160	6,973	8,186	AMHERST	2000		0	0	8,186	0	0
Andover	14,367	6,609	7,758	NESWC	2005		0	7,758	0	0	0
Arlington	25,566	11,760	13,806	NESWC	2005		0	13,806	0	0	0
Ashburnham	2,465	1,134	1,331	LOCAL	1998		1,331	0	0	0	0
Ashby	1,292	595	698	LOCAL	1999		698	0	0	0	0
Ashfield	505	232	273	NORTHAMPTON	2004		0	0	273	0	0
Ashland	5,284	2,431	2,854	SPOT	1993	PLAINVILLE	2,854	0	0	0	2,854
Athol	5,023	2,311	2,712	SPOT	1993		2,712	0	0	0	2,712
Attleboro	24,099	11,086	13,014	ATTLEBORO	1993		13,014	0	0	0	0
Auburn	6,033	2,775	3,258	MILLBURY	2008		0	3,258	0	0	0
Avon	2,628	1,209	1,419	E.BRIDGEWATER	1996		1,419	0	0	0	0
Ayer	2,555	1,175	1,379	OGDEN-HAVERHILL	1997		1,379	0	0	0	0
Barnstable	23,509	10,814	12,695	SEMASS	2016		0	12,695	0	0	0
Barre	3,760	1,729	2,030	RCI-BARRE	1996		2,030	0	0	0	0
Becket	678	312	366	SPOT	1993	MILLBURY/PITTSFI	366	0	0	0	366
Bedford	7,235	3,328	3,907	NESWC	2005		0	3,907	0	0	0
Belchertown	4,861	2,236	2,625	LOCAL	1993		2,625	0	0	0	0
Bellingham	6,607	3,039	3,568	SEMASS	2010		0	3,568	0	0	0
Belmont	15,235	7,008	8,227	NESWC	2005		0	8,227	0	0	0
Berkley	1,630	750	880	SPOT	1993	TAUTON	880	0	0	0	880
Berlin	1,005	462	543	SPOT	1993	PLAINVILLE	543	0	0	0	543
Bernardston	900	414	486	LOCAL	1998		486	0	0	0	0
Beverly	28,030	12,894	15,136	SAUGUS	2002		0	15,136	0	0	0
Billerica	19,152	8,810	10,342	E.BRIDGEWATER	1996		10,342	0	0	0	0
Blackstone	3,577	1,645	1,931	LOCAL	1999		1,931	0	0	0	0
Blandford	544	250	294	SPOT	1993	MILLBURY/PITTSFI	294	0	0	0	294
Bolton	1,405	646	759	LOCAL	1998		759	0	0	0	0
Boston		0	0	PLAINVILLE	1995		0	0	0	0	0
Boston		0	0	SPOT	1993	NH	0	0	0	0	0
Boston	252,193	116,009	136,184	E.BRIDGEWATER	1996		136,184	0	0	0	0
Bourne	9,936	4,571	5,366	LOCAL	1998		5,366	0	0	0	0
Boxboro	686	316	371	NESWC	2005		0	371	0	0	0
Boxford	2,754	1,267	1,487	LOCAL	1998		1,487	0	0	0	0
Boylston	1,682	774	908	SPOT	1993	PLAINVILLE	908	0	0	0	908
Braintree	18,738	8,619	10,118	SEMASS	2008		0	10,118	0	0	0

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Brewster	6,172	2,839	3,333	SEMASS	2015		0	3,333	0	0	0
Bridgewater	8,312	3,824	4,489	SPOT	1993	E.BRIDGEWATER	4,489	0	0	0	4,489
Brimfield	652	300	352	PALMER	1994		352	0	0	0	0
Brockton	36,144	16,626	19,518	E.BRIDGEWATER	1996		19,518	0	0	0	0
Brookfield	1,999	920	1,080	LOCAL	1996		1,080	0	0	0	0
Brookline	19,944	9,174	10,770	MAINE	1994		10,770	0	0	0	10,770
Buckland	868	399	469	LOCAL	1995		469	0	0	0	0
Burlington	11,270	5,184	6,086	NESWC	2005		0	6,086	0	0	0
Cambridge	35,964	16,544	19,421	SPOT	1993	NH	19,421	0	0	0	19,421
Canton	8,226	3,784	4,442	SEMASS	2015		0	4,442	0	0	0
Carlisle	2,313	1,064	1,249	NESWC	2005		0	1,249	0	0	0
Carver	9,657	4,442	5,215	SEMASS	2013		0	5,215	0	0	0
Charlemont	569	262	307	GRANBY	1996		307	0	0	0	0
Charlton	5,655	2,601	3,054	LOCAL	1994		3,054	0	0	0	0
Chatham	4,999	2,299	2,699	SEMASS	2016		0	2,699	0	0	0
Chelmsford	16,829	7,741	9,088	SPOT	1993	OGDEN-HAVERHIL	9,088	0	0	0	9,088
Chelsea	15,558	7,157	8,401	SAUGUS	2005		0	8,401	0	0	0
Cheshire	1,060	488	572	GRANBY	1996		572	0	0	0	0
Chester	568	261	307	SPOT	1993	MILLBURY/PITTSFI	307	0	0	0	307
Chesterfield	249	114	134	NORTHAMPTON	2004		0	0	134	0	0
Chicopee	35,042	16,119	18,923	CHICOPEE-PARTYKA	2011		0	0	18,923	0	0
Chilmark	848	390	458	SEMASS	2008		0	458	0	0	0
Clarksbrug	1,191	548	643	LOCAL	1999		643	0	0	0	0
Clinton	2,756	1,268	1,488	RCI-BARRE	1996		1,488	0	0	0	0
Cohasset	3,833	1,763	2,070	SEMASS	2002		0	2,070	0	0	0
Colrain	518	238	280	LOCAL	1994		280	0	0	0	0
Concord	12,125	5,578	6,548	LOCAL	1994		6,548	0	0	0	0
Conway	417	192	225	GRANBY	1996		225	0	0	0	0
Cummington	442	203	239	NORTHAMPTON	2004		0	0	239	0	0
Dalton	1,561	718	843	PITTSFIELD	2006		0	843	0	0	0
Danvers	13,024	5,991	7,033	OGDEN-HAVERHILL	1994		7,033	0	0	0	0
Dartmouth	11,935	5,490	6,445	LOCAL	1995		6,445	0	0	0	0
Dedham	9,216	4,240	4,977	PLAINVILLE	1995		4,977	0	0	0	0
Deerfield	2,530	1,164	1,366	LOCAL	1996		1,366	0	0	0	0
Dennis	12,136	5,582	6,553	SEMASS	2008		0	6,553	0	0	0
Dighton	3,395	1,562	1,833	LOCAL	1997		1,833	0	0	0	0
Douglas	1,592	732	860	SPOT	1993	MILLBURY/BFI-FAL	860	0	0	0	860
Dover	2,965	1,364	1,601	MILLBURY	2007		0	1,601	0	0	0
Dracut	12,665	5,826	6,839	NESWC	2005		0	6,839	0	0	0
Dudley	4,174	1,920	2,254	LOCAL	1994		2,254	0	0	0	0
Dunstable	1,268	583	685	LOCAL	1993		685	0	0	0	0
Duxbury	8,295	3,816	4,479	E.BRIDGEWATER	1996		4,479	0	0	0	0

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Eastham	4,172	1,919	2,253	SEMASS	2008		0	2,253	0	0	0
Easthampton	6,197	2,851	3,346	NORTHAMPTON	2004		0	0	3,346	0	0
Easton	9,929	4,567	5,362	LOCAL	1998		5,362	0	0	0	0
Edgartown	4,645	2,137	2,508	SEMASS	2008		0	2,508	0	0	0
Egremont	742	341	401	SPOT	1993	GRANBY/PITTSFIE	401	0	0	0	401
Erving	285	131	154	SPOT	1993	GRANBY	154	0	0	0	154
Essex	1,130	520	610	OGDEN-HAVERHILL	2002		0	610	0	0	0
Everett	20,272	9,325	10,947	SAUGUS	1995		10,947	0	0	0	0
E.Bridgewater	4,819	2,217	2,602	E.BRIDGEWATER	1996		2,602	0	0	0	0
E.Brookfield	789	363	426	MILLBURY	2008		0	426	0	0	0
E.Longmeadow	4,963	2,283	2,680	SPRINGFIELD	2013		0	2,680	0	0	0
Fairhaven	11,937	5,491	6,446	SEMASS	2016		0	6,446	0	0	0
Fall River	46,131	21,220	24,911	FALL RIVER	2000		0	0	0	0	0
Falmouth	22,419	10,313	12,106	SEMASS	2008		0	12,106	0	0	0
Fitchburg	17,742	8,162	9,581	WESTMINISTER	1998		9,581	0	0	0	0
Florida	326	150	176	SPOT	1993	UNKNOWN	176	0	0	0	176
Foxborough	5,796	2,666	3,130	LOCAL	1996		3,130	0	0	0	0
Framingham	25,816	11,875	13,940	SPOT	1993	MILLBURY/BFI-FAL	13,940	0	0	0	13,940
Franklin	9,749	4,484	5,264	MILLBURY	2007		0	5,264	0	0	0
Freetown	3,877	1,784	2,094	SEMASS	2016		0	2,094	0	0	0
Gardner	7,199	3,312	3,888	LOCAL	1998		3,888	0	0	0	0
Gay Head	189	87	102	SEMASS	2008		0	102	0	0	0
Georgetown	2,838	1,305	1,532	SPOT	1993	UNKNOWN	1,532	0	0	0	1,532
Gill	693	319	374	BERNARDSTON	1998		374	0	0	0	0
Gloucester	10,638	4,894	5,745	PEABODY	1995		5,745	0	0	0	0
Goshen	401	184	216	NORTHAMPTON	2004		0	0	216	0	0
Gosnold	37	17	20	SEMASS	1993		20	0	0	0	0
Grafton	4,802	2,209	2,593	MILLBURY	2007		0	2,593	0	0	0
Granby	2,485	1,143	1,342	GRANBY	1996		1,342	0	0	0	0
Granville	648	298	350	SPOT	1993	MILLBURY/PITTSFI	350	0	0	0	350
Greenfield	6,853	3,152	3,701	SPRINGFIELD	2114		0	3,701	0	0	0
Groton	1,997	919	1,078	OGDEN-HAVERHILL	2005		0	1,078	0	0	0
Groveland	2,289	1,053	1,236	NH	1993		1,236	0	0	0	1,236
Gt.Barrington	3,320	1,527	1,793	LOCAL	1995		1,793	0	0	0	0
Hadley	1,629	749	880	SPOT	1993	BARRE	880	0	0	0	880
Halifax	3,719	1,711	2,008	SEMASS	1995		2,008	0	0	0	0
Hamilton	3,399	1,564	1,836	NESWC	2005		0	1,836	0	0	0
Hampden	1,605	738	867	LOCAL	1994		867	0	0	0	0
Hancock	270	124	146	PITTSFIELD	2006		0	146	0	0	0
Hanover	6,953	3,199	3,755	E.BRIDGEWATER	1996		3,755	0	0	0	0
Hanson	3,985	1,833	2,152	SEMASS	2009		0	2,152	0	0	0
Hardwick	1,068	491	577	HARDWICK	1993		577	0	0	0	0

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Harvard	5,513	2,536	2,977	SPOT	1993	PLAINVILLE	2,977	0	0	0	2,977
Harwich	7,178	3,302	3,876	SEMASS	2016		0	3,876	0	0	0
Hatfield	1,413	650	763	NORTHAMPTON	2004		0	0	763	0	0
Haverhill	25,416	11,691	13,725	OGDEN-HAVERHILL	2002		0	13,725	0	0	0
Hawley	152	70	82	SPOT	1993	NORTHAMPTON	82	0	0	0	82
Heath	234	108	126	SPRINGFIELD	2014		0	126	0	0	0
Hingham	8,557	3,936	4,621	LOCAL	1998		4,621	0	0	0	0
Hinsdale	696	320	376	PITTSFIELD	2006		0	376	0	0	0
Holbrook	4,921	2,263	2,657	LOCAL	1995		2,657	0	0	0	0
Holden	6,001	2,760	3,240	MILLBURY	2007		0	3,240	0	0	0
Holland	1,011	465	546	LOCAL	1993		546	0	0	0	0
Holliston	6,664	3,066	3,599	MILLBURY	2008		0	3,599	0	0	0
Holyoke	13,845	6,369	7,477	GRANBY	1996		7,477	0	0	0	0
Hopedale	1,736	798	937	MILLBURY	2008		0	937	0	0	0
Hopkinton	4,340	1,996	2,344	MILLBURY	2009		0	2,344	0	0	0
Hubbardston	1,286	591	694	SPOT	1993	MILLBURY	694	0	0	0	694
Hudson	7,739	3,560	4,179	HUDSON-STOW-REGI	1994		4,179	0	0	0	0
Hull	4,464	2,053	2,410	LOCAL	1994		2,410	0	0	0	0
Huntington	589	271	318	NORTHAMPTON	2004		0	0	318	0	0
Ipswich	6,656	3,062	3,594	SPOT	1993	NESWC	3,594	0	0	0	3,594
Kingston	4,116	1,894	2,223	SEMASS	2015		0	2,223	0	0	0
Lakeville	2,830	1,302	1,528	LOCAL	1995		1,528	0	0	0	0
Lancaster	2,894	1,331	1,563	SPOT	1993	UNKNOWN	1,563	0	0	0	1,563
Lanesborough	1,373	632	741	PITTSFIELD	2006		0	741	0	0	0
Lawrence	28,995	13,338	15,657	OGDEN-HAVERHILL	2002		0	15,657	0	0	0
Lee	3,284	1,511	1,773	PITTSFIELD	2006		0	1,773	0	0	0
Leicester	4,468	2,055	2,413	SPOT	1993	RCI-BARRE/MILLB	2,413	0	0	0	2,413
Lenox	1,961	902	1,059	PITTSFIELD	2006		0	1,059	0	0	0
Leominster	16,665	7,666	8,999	SPOT	1993	OGDEN-HAVERHIL	8,999	0	0	0	8,999
Leverett	990	455	535	LOCAL	1993		535	0	0	0	0
Lexington	16,089	7,401	8,688	NESWC	2005		0	8,688	0	0	0
Leyden	314	144	170	BERNARDSTON	1998		170	0	0	0	0
Lincoln	2,918	1,342	1,576	NESWC	2005		0	1,576	0	0	0
Littleton	3,158	1,453	1,705	OGDEN-HAVERHILL	2005		0	1,705	0	0	0
Longmeadow	10,405	4,786	5,619	SPRINGFIELD	2014		0	5,619	0	0	0
Lowell	60,183	27,684	32,499	RCI-BARRE	1996		32,499	0	0	0	0
Ludlow	9,163	4,215	4,948	SPRINGFIELD	2011		0	4,948	0	0	0
Lunenburg	6,517	2,998	3,519	LOCAL	1994		3,519	0	0	0	0
Lynn	37,758	17,369	20,389	SAUGUS	1995		20,389	0	0	0	0
Lynnfield	5,419	2,493	2,926	OGDEN-HAVERHILL	2004		0	2,926	0	0	0
Malden	25,261	11,620	13,641	SAUGUS	1995		13,641	0	0	0	0
Manchester	2,846	1,309	1,537	NESWC	2005		0	1,537	0	0	0

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Mansfield	8,229	3,786	4,444	BFI-FALL RIVER	1997		4,444	0	0	0	0
Marblehead	13,916	6,401	7,515	SPOT	1993	OGDEN-HAVERHIL	7,515	0	0	0	7,515
Marion	3,756	1,728	2,028	SEMASS	2013		0	2,028	0	0	0
Marlboro	11,585	5,329	6,256	SPOT	1993	SEMASS/MILLBUR	6,256	0	0	0	6,256
Marshfield	17,472	8,037	9,435	LOCAL	1996		9,435	0	0	0	0
Mashpee	10,965	5,044	5,921	SEMASS	2009		0	5,921	0	0	0
Mattapoisett	2,590	1,191	1,399	SEMASS	2008		0	1,399	0	0	0
Maynard	3,917	1,802	2,115	MILLBURY	2008		0	2,115	0	0	0
Medfield	5,329	2,451	2,877	MILLBURY	2008		0	2,877	0	0	0
Medford	29,605	13,618	15,987	SPOT	1993	OGDEN-HAVERHIL	15,987	0	0	0	15,987
Medway	4,571	2,103	2,469	MILLBURY	2008		0	2,469	0	0	0
Melrose	12,666	5,827	6,840	SAUGUS	1995		6,840	0	0	0	0
Mendon	1,711	787	924	MILLBURY	2008		0	924	0	0	0
Merrimac	2,306	1,061	1,245	LOCAL	1996		1,245	0	0	0	0
Methuen	17,702	8,143	9,559	SPOT	1993	OGDEN-HAVERHIL	9,559	0	0	0	9,559
Middleborough	12,472	5,737	6,735	SEMASS	2008		0	6,735	0	0	0
Middlefield	184	85	99	NORTHAMPTON	2004		0	0	99	0	0
Middleton	3,562	1,639	1,924	LOCAL	1995		1,924	0	0	0	0
Milford	8,999	4,139	4,859	MILLBURY	2007		0	4,859	0	0	0
Millbury	5,307	2,441	2,866	MILLBURY	2005		0	2,866	0	0	0
Millis	2,023	931	1,092	MILLBURY	2009		0	1,092	0	0	0
Millville	987	454	533	MILLBURY	2007		0	533	0	0	0
Milton	16,266	7,482	8,784	LOCAL	1995		8,784	0	0	0	0
Monroe	78	36	42	SPOT	1993	GRANBY/PITTSFIE	42	0	0	0	42
Monson	3,457	1,590	1,867	SPOT	1993	CHICOPEE-PARTY	1,867	0	0	0	1,867
Montague	6,523	3,001	3,522	LOCAL	1998		3,522	0	0	0	0
Monterey	407	187	220	SPOT	1993	GRANBY/PITTSFIE	220	0	0	0	220
Montgomery	342	157	185	SPOT	1993	UNKNOWN	185	0	0	0	185
Mt.Washington	76	35	41	SPOT	1993	MILLBURY/PITTSFI	41	0	0	0	41
Nahant	2,290	1,053	1,237	SPOT	1993	SAUGUS	1,237	0	0	0	1,237
Nantucket	6,774	3,116	3,658	LOCAL	1998		3,658	0	0	0	0
Natick	12,099	5,566	6,534	MILLBURY	2009		0	6,534	0	0	0
Needham	19,538	8,988	10,551	MILLBURY	2008		0	10,551	0	0	0
New Ashford	81	37	44	WILLIAMSTOWM	1993		44	0	0	0	0
New Bedford	42,831	19,702	23,129	LOCAL	1994		23,129	0	0	0	0
New Braintree	327	150	177	SPOT	1993	UNKNOWN	177	0	0	0	177
New Marlboro	586	270	316	SPOT	1993	GRANBY/PITTSFIE	316	0	0	0	316
New Salem	324	149	175	ORANGE	1994		175	0	0	0	0
Newbury	2,554	1,175	1,379	LOCAL	1998		1,379	0	0	0	0
Newburyport	11,637	5,353	6,284	NH	1993		6,284	0	0	0	6,284
Newton	46,721	21,492	25,230	MILLBURY	2009		0	25,230	0	0	0
Norfolk	4,230	1,946	2,284	SPOT	1993	PLAINVILLE	2,284	0	0	0	2,284

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North Adams	6,427	2,956	3,471	SPOT	1993	GRANBY/CHICOPE	3,471	0	0	0	3,471
North Andover	10,951	5,038	5,914	NESWC	2005		0	5,914	0	0	0
North Reading	8,788	4,043	4,746	NESWC	2005		0	4,746	0	0	0
Northampton	12,690	5,837	6,853	NORTHAMPTON	2004		0	0	6,853	0	0
Northboro	5,814	2,674	3,139	MILLBURY	2008		0	3,139	0	0	0
Northbridge	4,279	1,969	2,311	MILLBURY	2007		0	2,311	0	0	0
Northfield	1,055	485	570	NH	1993		570	0	0	0	570
Norton	6,284	2,891	3,393	SPOT	1993	UNKNOWN	3,393	0	0	0	3,393
Norwell	3,198	1,471	1,727	SEMASS	2016		0	1,727	0	0	0
Norwood	13,023	5,990	7,032	PLAINVILLE	1995		7,032	0	0	0	0
N.Attleboro	9,600	4,416	5,184	LOCAL	1997		5,184	0	0	0	0
N.Brookfield	2,478	1,140	1,338	LOCAL	1995		1,338	0	0	0	0
Oak Bluff	3,923	1,804	2,118	SEMASS	2008		0	2,118	0	0	0
Oakham	684	315	370	SPOT	1993	RCI-BARRE/MILLB	370	0	0	0	370
Orange	3,125	1,438	1,688	ORANGE	1994		1,688	0	0	0	0
Orleans	4,005	1,842	2,163	SEMASS	2008		0	2,163	0	0	0
Otis	498	229	269	SPOT	1993	MILLBURY/PITTSFI	269	0	0	0	269
Oxford	6,525	3,002	3,524	MILLBURY	2005		0	3,524	0	0	0
Palmer	5,346	2,459	2,887	PALMER	1994		2,887	0	0	0	0
Paxton	1,659	763	896	MILLBURY	2008		0	896	0	0	0
Peabody	20,568	9,461	11,107	NESWC	2005		0	11,107	0	0	0
Pelham	393	181	212	SPOT	1993	AMHERST	212	0	0	0	212
Pembroke	6,445	2,965	3,481	LOCAL	1993		3,481	0	0	0	0
Pepperell	3,208	1,476	1,732	SPOT	1993	UNKNOWN	1,732	0	0	0	1,732
Peru	373	172	202	SPOT	1993	GRANBY/PITTSFIE	202	0	0	0	202
Petersham	410	189	221	RCI-BARRE	1996		221	0	0	0	0
Phillipston	640	294	346	SPOT	1993		346	0	0	0	346
Pittsfield	19,466	8,954	10,512	PITTSFIELD	2006		0	10,512	0	0	0
Plainfield	139	64	75	NORTHAMPTON	2004		0	0	75	0	0
Plainville	3,039	1,398	1,641	PLAINVILLE	1995		1,641	0	0	0	0
Plymouth	19,843	9,128	10,715	SEMASS	2006		0	10,715	0	0	0
Plympton	1,098	505	593	SPOT	1993	SEMASS	593	0	0	0	593
Princeton	1,202	553	649	MILLBURY	2008		0	649	0	0	0
Provincetown	3,386	1,558	1,829	SEMASS	2008		0	1,829	0	0	0
Qunicy	24,660	11,344	13,317	SPOT	1993	E. BRIDGEWATER	13,317	0	0	0	13,317
Randolph	13,318	6,126	7,192	BFI-RANDOL	1995		7,192	0	0	0	0
Raynham	5,069	2,332	2,737	LOCAL	1998		2,737	0	0	0	0
Reading	11,715	5,389	6,326	SAUGUS	1995		6,326	0	0	0	0
Rehoboth	3,918	1,802	2,116	LOCAL	1995		2,116	0	0	0	0
Revere	26,488	12,185	14,304	SAUGUS	1995		14,304	0	0	0	0
Richmond	774	356	418	PITTSFIELD	2006		0	418	0	0	0
Rochester	1,815	835	980	SEMASS	2016		0	980	0	0	0

APPENDIX H -- Integrated Solid Waste Management Projections

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Rockland	10,002	4,601	5,401	LOCAL	1998		5,401	0	0	0	0
Rockport	3,974	1,828	2,146	SAUGUS	2004		0	2,146	0	0	0
Rowe	179	82	97	GRANBY	1996		97	0	0	0	0
Rowley	1,997	919	1,079	SPOT	1993	UNKNOWN	1,079	0	0	0	1,079
Royalston	525	242	284	LOCAL	1998		284	0	0	0	0
Russell	722	332	390	SPOT	1993	MILLBURY/PITTSFI	390	0	0	0	390
Rutland	2,075	954	1,120	MILLBURY	2008		0	1,120	0	0	0
Salem	19,925	9,165	10,759	PLAINVILLE	1995		10,759	0	0	0	0
Salisbury	3,294	1,515	1,779	OGDEN-HAVERHILL	2000		0	1,779	0	0	0
Sandisfield	342	157	185	SPOT	1993	MILLBURY/PITTSFI	185	0	0	0	185
Sandwich	13,561	6,238	7,323	SEMASS	2008		0	7,323	0	0	0
Saugus	15,498	7,129	8,369	SAUGUS	1995		8,369	0	0	0	0
Savoy	307	141	166	ADAMS	1994		166	0	0	0	0
Scituate	11,088	5,100	5,987	LOCAL	1998		5,987	0	0	0	0
Seekonk	3,514	1,616	1,897	LOCAL	1993		1,897	0	0	0	0
Sharon	7,195	3,309	3,885	SEMASS	2016		0	3,885	0	0	0
Sheffield	1,278	588	690	SPOT	1993	GRANBY/PITTSFIE	690	0	0	0	690
Shelburne	429	197	231	PLAINVILLE	1995		231	0	0	0	0
Sherborn	2,009	924	1,085	MILLBURY	2007		0	1,085	0	0	0
Shirley	3,061	1,408	1,653	LOCAL	1996		1,653	0	0	0	0
Shrewsbury	11,826	5,440	6,386	MILLBURY	2008		0	6,386	0	0	0
Shutesbury	372	171	201	AMHERST	2000		0	0	201	0	0
Somerset	9,190	4,227	4,963	E.BRIDGEWATER	1996		4,963	0	0	0	0
Somerville	34,066	15,671	18,396	SPOT	1993	OGDEN-HAVERHIL	18,396	0	0	0	18,396
South Hadley	10,553	4,855	5,699	LOCAL	1995		5,699	0	0	0	0
Southampton	2,732	1,257	1,475	LOCAL	1995		1,475	0	0	0	0
Southboro	10,072	4,633	5,439	MILLBURY	2008		0	5,439	0	0	0
Southbridge	3,441	1,583	1,858	LOCAL	2000		0	0	0	1,858	0
Southwick	4,462	2,053	2,410	SPRINGFIELD	2011		0	2,410	0	0	0
Spencer	7,456	3,430	4,026	MILLBURY	2008		0	4,026	0	0	0
Springfield	57,547	26,472	31,075	SPRINGFIELD	2012		0	31,075	0	0	0
Sterling	2,553	1,174	1,379	OGDEN-HAVERHILL	2007		0	1,379	0	0	0
Stockbridge	2,041	939	1,102	SPOT	1993	GRANBY	1,102	0	0	0	1,102
Stoneham	11,313	5,204	6,109	SAUGUS	1995		6,109	0	0	0	0
Stoughton	10,369	4,770	5,599	SEMASS	2016		0	5,599	0	0	0
Stow	2,832	1,303	1,529	HUDSON-STOW-REGI	1994		1,529	0	0	0	0
Sturbridge	3,519	1,619	1,900	LOCAL	2000		0	0	0	1,900	0
Sudbury	6,383	2,936	3,447	LOCAL	1995		3,447	0	0	0	0
Sunderland	1,477	680	798	SPOT	1993	UNKNOWN	798	0	0	0	798
Sutton	6,246	2,873	3,373	LOCAL	1995		3,373	0	0	0	0
Swampscott	7,851	3,611	4,239	SAUGUS	1994		4,239	0	0	0	0
Swansea	8,188	3,767	4,422	E.BRIDGEWATER	1996		4,422	0	0	0	0

STATEWIDE WASTE DISPOSAL NEEDS ANALYSIS
CASE FOR
CALENDAR YEAR: 2000 46%

MUNICIPALITY	RES'L. TONNAGE	RES'L RECYCLE TONS @ 46%	RES'L BALANCE NEEDING DISPOSAL	1993 DISPOSAL SITE	LF CLOSE OR CON-TRACT END DATE	SPOT DISPOSAL SITE	CAL. YEAR 2000 LOST DISPOSAL CAPACITY	RESIDENTIAL WASTE TO COMBUSTION FACILITIES 2000	RESIDENTIAL WASTE TO COM\REGIONA LANDFILLS 2000	RESIDENTIAL WASTE TO MUNICIPAL LANDFILL 2000	RESIDENTIAL WASTE TO SPOT CONTRACT 2000
Taunton	15,862	7,296	8,565	LOCAL	1994		8,565	0	0	0	0
Templeton	3,882	1,786	2,096	LOCAL	1994		2,096	0	0	0	0
Tewksbury	13,205	6,074	7,131	NESWC	2005		0	7,131	0	0	0
Tisbury	3,329	1,531	1,797	SEMASS	2008		0	1,797	0	0	0
Tolland	135	62	73	SPOT	1993	MILLBURY/PITTSFI	73	0	0	0	73
Topsfield	2,894	1,331	1,563	LOCAL	1995		1,563	0	0	0	0
Townsend	4,007	1,843	2,164	LOCAL	1996		2,164	0	0	0	0
Truro	2,441	1,123	1,318	SEMASS	2008		0	1,318	0	0	0
Tyngsboro	3,791	1,744	2,047	SPOT	1993	SPRINGFIELD/VIC	2,047	0	0	0	2,047
Tyringham	87	40	47	PITTSFIELD	2006		0	47	0	0	0
Upton	1,781	819	962	MILLBURY	2007		0	962	0	0	0
Uxbridge	5,174	2,380	2,794	SPOT	1993	UNKNOWN	2,794	0	0	0	2,794
Wakefield	14,054	6,465	7,589	SAUGUS	1995		7,589	0	0	0	0
Wales	739	340	399	SPOT	1993	MILLBURY/PITTSFI	399	0	0	0	399
Walpole	8,707	4,005	4,702	MILLBURY	2009		0	4,702	0	0	0
Waltham	29,627	13,629	15,999	SEMASS	2010		0	15,999	0	0	0
Ware	2,914	1,341	1,574	LOCAL	1996		1,574	0	0	0	0
Wareham	8,696	4,000	4,696	SEMASS	2013		0	4,696	0	0	0
Warren	935	430	505	LOCAL	1998		505	0	0	0	0
Warwick	241	111	130	LOCAL	1997		130	0	0	0	0
Washington	132	61	71	PITTSFIELD	2006		0	71	0	0	0
Watertown	17,927	8,246	9,681	NESWC	2005		0	9,681	0	0	0
Wayland	3,569	1,642	1,927	LOCAL	2001		0	0	0	1,927	0
Webster	7,042	3,239	3,803	SPOT	1993	MILLBURY	3,803	0	0	0	3,803
Wellesley	17,431	8,018	9,413	PLAINVILLE	1995		9,413	0	0	0	0
Wellfleet	2,887	1,328	1,559	SEMASS	2011		0	1,559	0	0	0
Wendell	255	117	138	SPOT	1993	MILLBURY/PITTSFI	138	0	0	0	138
Wenham	1,465	674	791	NESWC	2005		0	791	0	0	0
West Newbury	1,672	769	903	NESWC	2005		0	903	0	0	0
West Tisbury	1,376	633	743	SEMASS	2008		0	743	0	0	0
Westboro	2,751	1,266	1,486	MILLBURY	2008		0	1,486	0	0	0
Westfield	16,828	7,741	9,087	LOCAL	1995		9,087	0	0	0	0
Westford	1,815	835	980	NESWC	2005		0	980	0	0	0
Westhampton	476	219	257	NORTHAMPTON	2004		0	0	257	0	0
Westminster	1,935	890	1,045	WESTMINSTER	1998		1,045	0	0	0	0
Weston	4,847	2,230	2,618	MILLBURY	2008		0	2,618	0	0	0
Westport	12,249	5,634	6,614	LOCAL	1995		6,614	0	0	0	0
Westwood	5,671	2,608	3,062	MILLBURY	2007		0	3,062	0	0	0
Weymouth	19,747	9,084	10,663	E.BRIDGEWATER	1996		10,663	0	0	0	0
Whately	621	286	336	NORTHAMPTON	2004		0	0	336	0	0
Whitman	4,866	2,238	2,627	SPOT	1993	SEMASS	2,627	0	0	0	2,627
Wilbraham	3,666	1,686	1,980	SPRINGFIELD	2014		0	1,980	0	0	0

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MUNICIPALITY	RES'L. TONNAGE	RES'L RECYCLE TONS @ 46%	RES'L BALANCE NEEDING DISPOSAL	1993 DISPOSAL SITE	LF CLOSE OR CON-TRACT END DATE	SPOT DISPOSAL SITE	CAL. YEAR 2000 LOST DISPOSAL CAPACITY	RESIDENTIAL WASTE TO COMBUSTION FACILITIES 2000	RESIDENTIAL WASTE TO COM\REGIONA LANDFILLS 2000	RESIDENTIAL WASTE TO MUNICIPAL LANDFILL 2000	RESIDENTIAL WASTE TO SPOT CONTRACT 2000
Williamsburg	1,028	473	555	NORTHAMPTON	2004		0	0	555	0	0
Williamstown	3,527	1,622	1,904	WILLIAMSTOWN	1993		1,904	0	0	0	0
Wilmington	10,438	4,801	5,636	NESWC	2005		0	5,636	0	0	0
Winchendon	3,923	1,805	2,118	LOCAL	1998		2,118	0	0	0	0
Winchester	12,827	5,900	6,927	NESWC	2005		0	6,927	0	0	0
Windsor	343	158	185	SPOT	1993	GRANBY/PITTSFIE	185	0	0	0	185
Winthrop	9,801	4,508	5,292	SAUGUS	1995		5,292	0	0	0	0
Woburn	17,718	8,150	9,568	SPOT	1993	PLAINVILLE/SAUG	9,568	0	0	0	9,568
Worcester	49,561	22,798	26,763	MILLBURY	2008		0	26,763	0	0	0
Worthington	530	244	286	NORTHAMPTON	2004		0	0	286	0	0
Wrentham	3,889	1,789	2,100	PLAINVILLE	1995		2,100	0	0	0	0
W.Boylston	6,122	2,816	3,306	OGDEN-HAVERHILL	2006		0	3,306	0	0	0
W.Bridgewater	3,126	1,438	1,688	SEMASS	2009		0	1,688	0	0	0
W.Brookfield	7,837	3,605	4,232	LOCAL	1996		4,232	0	0	0	0
W.Springfield	10,859	4,995	5,864	SPRINGFIELD	2014		0	5,864	0	0	0
W.Stockbridge	645	297	348	SPOT	1993	MILLBURY/PITTSFI	348	0	0	0	348
Yarmouth	13,778	6,338	7,440	SEMASS	2018		0	7,440	0	0	0
TOTALS	2,863,254	1,351,597	1,586,657	NA	NA	NA	878,546	595,954	41,060	5,686	220,519

APPENDIX I

SOLID WASTE STATUS REPORT ON MASSACHUSETTS CITIES AND TOWNS: presents 1992 solid waste management practices, disposal locations, and contract end dates for each Massachusetts municipality.

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
ACTON	NESWC/MAGIC		COMBUSTION:NORTH ANDOVER	
ASHBURNHAM		GGRRDG/NCC	LANDFILL:LOCAL	
ASHBY		CONCEWM/GGRRDG/N	LANDFILL:LOCAL	
ATHOL	Montachusett		REGIONAL LF:ATHOL	
AUBURN	CMRRC	CMRRC	COMBUSTION:MILLBURY	
AYER		CONCEWM	COMBUSTION:HAVERHILL	
BARRE			PRIVATE LF:BARRE	
BELLINGHAM	MILLIS		COMBUSTION:ROCHESTER	
BERLIN			SPOT:PRIVATE HAULER	PRIVATE LF:PLAINVILLE
BLACKSTONE			LANDFILL:LOCAL	
BOLTON			LANDFILL:LOCAL	
BOXBOROUGH	NESWC/MAGIC		COMBUSTION:NORTH ANDOVER	
BOYLSTON			SPOT:PRIVATE HAULER	PRIVATE LF:PLAINVILLE
BROOKFIELD	Brookfield	SCRAM	LANDFILL:LOCAL	
CHARLTON			LANDFILL:LOCAL	
CLINTON		CONCEWM	PRIVATE LF:BARRE	
DOUGLAS			SPOT:PRIVATE HAULER	MILLBURY/FALL RIV LF
DUDLEY			LANDFILL:LOCAL	
DUNSTABLE	NMAC		LANDFILL:LOCAL	
E BROOKFIELD	Brookfield	SCRAM	COMBUSTION:MILLBURY	
FITCHBURG	Montachusett	CONCEWM	REGIONAL LF:WESTMINSTER	
GARDNER	Montachusett	CONCEWM/GGRRDG/N	LANDFILL:LOCAL	
GRAFTON	CMRRC	CMRRC	COMBUSTION:MILLBURY	
GROTON	Shirley	CONCEWM	COMBUSTION:HAVERHILL	
HARDWICK		SCRAM	REGIONAL LF:HARDWICK	
HARVARD	MAGIC	CONCEWM	SPOT:PRIVATE HAULER	PRIVATE LF:PLAINVILLE
HOLDEN	CMRRC	CMRRC	SPOT:PRIVATE HAULER	MILLBURY
HOLLISTON	MILLIS	MILLIS	COMBUSTION:MILLBURY	
HOPEDALE	MILLIS	MILLIS	COMBUSTION:MILLBURY	
HOPKINTON	MILLIS	MILLIS	COMBUSTION:MILLBURY	
HUBBARDSTON	Montachusett	CONCEWM/GGRRDG/N	SPOT:PRIVATE HAULER	COMBUSTION:MILLBURY
HUDSON	MAGIC		REGIONAL LF:HUDSON-STOW	
LANCASTER			SPOT:PRIVATE HAULER	UNKNOWN
LEICESTER		CMRRC/SCRAM	SPOT:PRIVATE HAULER	BARRE/MILLBURY
LEOMINSTER	Montachusett	CONCEWM	SPOT:PRIVATE HAULER	COMBUSTION:HAVERHILL
LITTLETON			COMBUSTION:HAVERHILL	
LUNENBURG	Shirley	CONCEWM	LANDFILL:LOCAL	
MARLBOROUGH	MAGIC		SPOT:PRIVATE HAULER	ROCHESTER/MILLBURY
MAYNARD	MAGIC		COMBUSTION:MILLBURY	
MEDWAY		MILLIS	COMBUSTION:MILLBURY	
MENDON			COMBUSTION:MILLBURY	
MILFORD	MILLIS		COMBUSTION:MILLBURY	
MILLBURY	CMRRC	CMRRC	COMBUSTION:MILLBURY	
MILLVILLE			COMBUSTION:MILLBURY	
N BROOKFIELD	Brookfield	SCRAM	LANDFILL:LOCAL	
NEW BRAINTREE	Brookfield	SCRAM	SPOT:PRIVATE HAULER	UNKNOWN
NORTHBOROUGH	CMRRC	CMRRC	COMBUSTION:MILLBURY	
NORTHBRIDGE			COMBUSTION:MILLBURY	

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
OAKHAM			SPOT:PRIVATE HAULER	BARRE/MILLBURY
OXFORD	CMRRC	CMRRC	COMBUSTION:MILLBURY	
PAXTON			COMBUSTION:MILLBURY	
PEPPERELL	Shirley	CONCEWM	LANDFILL:LOCAL	
PETERSHAM		CONCEWM/GGRRDG/N	PRIVATE LF:BARRE	
PHILLIPSTON	Montachusett	CONCEWM	REGIONAL LF:ORANGE	
PRINCETON		CONCEWM/GGRRDG/N	COMBUSTION:MILLBURY	
ROYALSTON			LANDFILL:LOCAL	
RUTLAND	CMRRC	CMRRC	COMBUSTION:MILLBURY	
SHIRLEY	Shirley	CONCEWM	LANDFILL:LOCAL	
SHREWSBURY	CMRRC	CMRRC	COMBUSTION:MILLBURY	
SOUTHBOROUGH	CMRRC	CMRRC	COMBUSTION:MILLBURY	
SOUTHBRIDGE			LANDFILL:LOCAL	
SPENCER	CMRRC	SCRAM	COMBUSTION:MILLBURY	
STERLING		CONCEWM	REGIONAL LF:WESTMINSTER	
STOW	MAGIC		REGIONAL LF:HUDSON-STOW	
STURBRIDGE		SCRAM	LANDFILL:LOCAL	
SUTTON			LANDFILL:LOCAL	
TEMPLETON	Montachusett	CONCEWM/GGRRDG/N	LANDFILL:LOCAL	
TOWNSEND	Montachusett	CONCEWM/GGRRDG/N	LANDFILL:LOCAL	
TYNGSBOROUGH	NMAC		SPOT:PRIVATE HAULER	SPRINGFIELD/VICON
UPTON		MILLIS	COMBUSTION:MILLBURY	
UXBRIDGE			SPOT:PRIVATE HAULER	UNKNOWN
W BROOKFIELD	Brookfield	SCRAM	LANDFILL:LOCAL	
WARREN		SCRAM	LANDFILL:LOCAL	
WEBSTER		CMRRC	SPOT:PRIVATE HAULER	COMBUSTION:MILLBURY
WEST BOYLSTON		CMRRC	REGIONAL LF:WESTMINSTER	
WESTBOROUGH	CMRRC	CMRRC	COMBUSTION:MILLBURY	
WESTFORD	NESWC		COMBUSTION:NORTH ANDOVER	
WESTMINSTER		CONCEWM/GGRRDG/N	REGIONAL LF:WESTMINSTER	
WINCHENDON		CONCEWM/GGRRDG/N	LANDFILL:LOCAL	
WORCESTER	CMRRC	CMRRC	COMBUSTION:MILLBURY	
AMESBURY	NE Essex	NERRC	SPOT:PRIVATE HAULER	HAVERHILL/NH
ANDOVER	NESWC	NESWC	COMBUSTION:NORTH ANDOVER	
ARLINGTON	NESWC		COMBUSTION:NORTH ANDOVER	
ASHLAND	MILLIS	MILLIS	SPOT:PRIVATE HAULER	PRIVATE LF:PLAINVILLE
BEDFORD	NESWC		COMBUSTION:NORTH ANDOVER	
BELMONT	NESWC		COMBUSTION:NORTH ANDOVER	
BEVERLY	North Shore	NSRRC	COMBUSTION:SAUGUS	
BILLERICA	NMAC		COMBUSTION:NORTH ANDOVER	
BOSTON			NH:E BRIDGEWATER:PLAINVILLE	
BOXFORD	NE Essex	NERRC	LANDFILL:LOCAL	
BRAINTREE			COMBUSTION:ROCHESTER	
BROOKLINE			MAINE	
BURLINGTON	NESWC		COMBUSTION:NORTH ANDOVER	
CAMBRIDGE			SPOT:PRIVATE HAULER	ROCHESTER NH LF
CANTON			COMBUSTION:ROCHESTER	
CARLISLE	NESWC/MAGIC		COMBUSTION:NORTH ANDOVER	

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
CHELMSFORD	NMAC		SPOT:PRIVATE HAULER	HAVERHILL/NH/N ANDOVER
CHELSEA			COMBUSTION:SAUGUS	
COHASSET	SOUTH SHORE	SOUTH SHORE	COMBUSTION:ROCHESTER	
CONCORD	MAGIC		LANDFILL:LOCAL	
DANVERS	North Shore	NSRRC	COMBUSTION:HAVERHILL	
DEDHAM	MILLIS	MILLIS	PRIVATE LF:PLAINVILLE	
DOVER	MILLIS		COMBUSTION:MILLBURY	
DRACUT	NESWC/NMAC		COMBUSTION:NORTH ANDOVER	
ESSEX			COMBUSTION:HAVERHILL	
EVERETT			COMBUSTION:SAUGUS	
FRAMINGHAM	MILLIS	MILLIS	SPOT:PRIVATE HAULER	MILLBURY/FALL RIV LF
GEORGETOWN		NERRC	SPOT:PRIVATE HAULER	UNKNOWN
GLOUCESTER	North Shore	NSRRC	COMBUSTION:SAUGUS	
GROVELAND	NE Essex	NERRC	NEW HAMPSHIRE	
HAMILTON	NEWSC	NSRRC	COMBUSTION:NORTH ANDOVER	
HAVERHILL	NE Essex	NERRC	COMBUSTION:HAVERHILL	
HINGHAM	SOUTH SHORE	SOUTH SHORE	LANDFILL:LOCAL	
HOLBROOK			LANDFILL:LOCAL	
HULL	SOUTH SHORE	SOUTH SHORE	LANDFILL:LOCAL	
IPSWICH	NE Essex	NERRC	SPOT:PRIVATE HAULER	COMBUSTION:NTH ANDOV
LAWRENCE			COMBUSTION:HAVERHILL	
LEXINGTON	NESWC		COMBUSTION:NORTH ANDOVER	
LINCOLN	NESWC		COMBUSTION:NORTH ANDOVER	
LOWELL	NMAC		COMBUSTION:HAVERHILL	
LYNN	North Shore	NSRRC	COMBUSTION:SAUGUS	
LYNNFIELD			COMBUSTION:HAVERHILL	
MALDEN			COMBUSTION:SAUGUS	
MANCHESTER	NESWC/North Shore	NSRRC	COMBUSTION:NORTH ANDOVER	
MARBLEHEAD	North Shore	NSRRC	COMBUSTION:SAUGUS	
MEDFIELD	MILLIS	MILLIS	COMBUSTION:MILLBURY	
MEDFORD			SPOT:PRIVATE HAULER	COMBUSTION:HAVERHILL
MELROSE		NSRRC	COMBUSTION:SAUGUS	
MERRIMAC		NERRC	LANDFILL:LOCAL	
METHUEN			SPOT:PRIVATE HAULER	COMBUSTION:HAVERHILL
MIDDLETON	NE Essex	NERRC/HRMC	LANDFILL:LOCAL	
MILLIS	MILLIS	MILLIS	COMBUSTION:MILLBURY	
MILTON			LANDFILL:LOCAL	
N ANDOVER	NEWSC		COMBUSTION:NORTH ANDOVER	
N READING	NESWC		COMBUSTION:NORTH ANDOVER	
NAHANT	North Shore	NSRRC	SPOT:PRIVATE HAULER	COMBUSTION:SAUGUS
NATICK	MILLIS	MILLIS	COMBUSTION:MILLBURY	
NEEDHAM	MILLIS	MILLIS	COMBUSTION:MILLBURY	
NEWBURY	NE Essex	NERRC	LANDFILL:LOCAL	
NEWBURYPORT	NE Essex	NERRC	SPOT: PRIVATE HAULER	NEW HAMPSHIRE
NEWTON			COMBUSTION:MILLBURY	
NORFOLK	MILLIS	MILLIS	SPOT:PRIVATE HAULER	PRIVATE LF:PLAINVILLE
NORWOOD	MILLIS	MILLIS	PRIVATE LF:PLAINVILLE	
PEABODY	NESWC/North Shore	NSRRC	COMBUSTION:NORTH ANDOVER	

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
QUINCY			SPOT:PRIVATE HAULER	REG LF:E BRIDGEWATER
RANDOLPH			PRIVATE LF:RANDOLPH	
READING	North Shore	NSRRC	COMBUSTION:SAUGUS	
REVERE		NSRRC	COMBUSTION:SAUGUS	
ROCKPORT			COMBUSTION:SAUGUS	
ROWLEY	NE Essex	NERRC	SPOT:PRIVATE HAULER	UNKNOWN
SALEM	North Shore	NSRRC	PRIVATE LF:PLAINVILLE	
SALISBURY	NE Essex	NERRC	COMBUSTION:HAVERHILL	
SAUGUS	North Shore	NSRRC	COMBUSTION:SAUGUS	
SHERBORN	MILLIS	MILLIS	COMBUSTION:MILLBURY	
SOMERVILLE			SPOT:PRIVATE HAULER	HAVERHILL/NH
STONEHAM			COMBUSTION:SAUGUS	
SUDBURY	MILLIS/MAGIC		LANDFILL:LOCAL	
SWAMPSCOTT	North Shore	NSRRC	COMBUSTION:SAUGUS	
TEWKSBURY	NEWSC/NMAC		COMBUSTION:NORTH ANDOVER	
TOPSFILED	NE Essex	NERRC	LANDFILL:LOCAL	
WAKEFIELD			COMBUSTION:SAUGUS	
WALPOLE	MILLIS	MILLIS	COMBUSTION:MILLBURY	
WALTHAM			COMBUSTION:ROCHESTER	
WATERTOWN	NEWSC		COMBUSTION:NORTH ANDOVER	
WAYLAND	MILLIS		LANDFILL:LOCAL	
WELLESLEY			PRIVATE LF:PLAINVILLE	
WENHAM	NESWC		COMBUSTION:NORTH ANDOVER	
WEST NEWBURY	NESWC/NE Essex	NERRC	COMBUSTION:NORTH ANDOVER	
WESTON			COMBUSTION:MILLBURY	
WESTWOOD	MILLIS	MILLIS	COMBUSTION:MILLBURY	
WEYMOUTH	SOUTH SHORE	SOUTH SHORE	PRIVATE LF:E BRIDGEWATER	
WILMINGTON	NESWC	NSRRC	COMBUSTION:NORTH ANDOVER	
WINCHESTER	NESWC	CONCEWM	COMBUSTION:NORTH ANDOVER	
WINTHROP			COMBUSTION:SAUGUS	
WOBURN			SPOT:PRIVATE HAULER	PLAINVILLE/SAUGUS
ABINGTON			SPOT:PRIVATE HAULER	REGION LF:MATTAPOISETT
ACUSHNET			COMBUSTION:ROCHESTER	
ATTLEBORO	ANAWAN	ANAWAN	PRIVATE LF:ATTLEBORO	
AVON			PRIVATE LF:E BRIDGEWATER	
BARNSTABLE	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
BERKLEY	ANAWAN	ANAWAN	SPOT:PRIVATE HAULER	REG LF:TAUNTON
BOURNE	CCPEDC/Barn.	CAPE	LANDFILL:LOCAL	
BREWSTER	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
BRIDGEWATER			SPOT:PRIVATE HAULER	REG LF:E BRIDGEWATER
BROCKTON			PRIVATE LF:E BRIDGEWATER	
CARVER	Car/Mar/Wareham		COMBUSTION:ROCHESTER	
CHATHAM	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
CHILMARK	MVRDRRD	MVRDRRD	COMBUSTION:ROCHESTER	
DARTMOUTH	GNBRRMD	GNBRRMD	LANDFILL:LOCAL	
DENNIS	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
DIGHTON	ANAWAN		LANDFILL:LOCAL	
DUXBURY	SOUTH SHORE	SOUTH SHORE	PRIVATE LF:E BRIDGEWATER	

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
E BRIDGEWATER			PRIVATE LF:E BRIDGEWATER	
EASTHAM	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
EASTON	ANAWAN	ANAWAN	LANDFILL:LOCAL	
EDGARTOWN	MVRDRRD	MVRDRRD	COMBUSTION:ROCHESTER	
FAIRHAVEN			COMBUSTION:ROCHESTER	
FALL RIVER			INCINERATOR:FALLRIVER	
FALMOUTH	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
FOXBOROUGH	ANAWAN	MILLIS/ANAWAN	LANDFILL:LOCAL	
FRANKLIN		MILLIS	COMBUSTION:MILLBURY	
FREETOWN			COMBUSTION:ROCHESTER	
GAY HEAD	MVRDRRD	MVRDRRD	COMBUSTION:ROCHESTER	
GOSNOLD		MVRDRRD/HRMC	LANDFILL:LOCAL	
HALIFAX			COMBUSTION:ROCHESTER	
HANOVER	SOUTH SHORE	SOUTH SHORE	PRIVATE LF:E BRIDGEWATER	
HANSON			COMBUSTION:ROCHESTER	
HARWICH	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
KINGSTON			COMBUSTION:ROCHESTER	
LAKEVILLE			LANDFILL:LOCAL	
MANSFIELD	ANAWAN	MILLIS/ANAWAN	PRIVATE LF:PLAINVILLE	
MARION	Car/Mar/Wareham		COMBUSTION:ROCHESTER	
MARSHFIELD	SOUTH SHORE	SOUTH SHORE	LANDFILL:LOCAL	
MASHPEE	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
MATTAPOISETT			COMBUSTION:ROCHESTER	
MIDDLEBORO			COMBUSTION:ROCHESTER	
N ATTLEBORO	ANAWAN		LANDFILL:LOCAL	
NANTUCKET	(ONE TOWN REGION)		LANDFILL:LOCAL	
NEW BEDFORD	GNBRRMD	GNBRRMD	COMBUSTION:ROCHESTER	
NORTON	ANAWAN	ANAWAN	SPOT:PRIVATE HAULER	UNKNOWN
NORWELL	SOUTH SHORE	SOUTH SHORE	COMBUSTION:ROCHESTER	
OAK BLUFF	MVRDRRD	MVRDRRD	COMBUSTION:ROCHESTER	
ORLEANS	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
PEMBROKE			LANDFILL:LOCAL	
PLAINVILLE	ANAWAN		PRIVATE LF:PLAINVILLE	
PLYMOUTH			COMBUSTION:ROCHESTER	
PLYMPTON			SPOT:PRIVATE HAULER	COMBUSTION:ROCHESTER
PROVINCETOWN	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
RAYNHAM	ANAWAN		LANDFILL:LOCAL	
REHOBOTH	ANAWAN	ANAWAN	LANDFILL:LOCAL	
ROCHESTER			COMBUSTION:ROCHESTER	
ROCKLAND	SOUTH SHORE	SOUTH SHORE	LANDFILL:LOCAL	
SANDWICH	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
SCITUATE	SOUTH SHORE	SOUTH SHORE	LANDFILL:LOCAL	
SEEKONK	ANAWAN	ANAWAN	PRIVATE LF:FALL RIVER	
SHARON			COMBUSTION:ROCHESTER	
SOMERSET	ANAWAN	ANAWAN	PRIVATE LF:E BRIDGEWATER	
STOUGHTON			COMBUSTION:ROCHESTER	
SWANSEA	ANAWAN	ANAWAN	PRIVATE LF:E BRIDGEWATER	
TAUNTON	ANAWAN	ANAWAN	LANDFILL:LOCAL	

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
TISBURY	MVRDRRD	MVRDRRD	COMBUSTION:ROCHESTER	
TRURO	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
W BRIDGEWATER			COMBUSTION:ROCHESTER	
WAREHAM	Car/Mar/Wareham		COMBUSTION:ROCHESTER	
WELLFLEET	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
WEST TISBURY	MVRDRRD	MVRDRRD	COMBUSTION:ROCHESTER	
WESTPORT			LANDFILL:LOCAL	
WHITMAN			SPOT:PRIVATE HAULER	COMBUSTION:ROCHESTER
WRENTHAM	MILLIS/ANAWAN	MILLIS	PRIVATE LF:PLAINVILLE	
YARMOUTH	CCPEDC/Barn.	CAPE	COMBUSTION:ROCHESTER	
ADAMS	North Berkshire		REGIONAL LF:ADAMS	
AGAWAM			COMBUSTION:SPRINGFIELD	
ALFORD	South Berkshire		SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
AMHERST	East Hampshire		REGIONAL LF:AMHERST	
ASHFIELD		HRMC	REGIONAL LF:NORTHAMPTON	
BECKET	South Hampshire		SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
BELCHERTOWN	East Hampshire		COMBUSTION:SPRINGFIELD	
BERNARDSTON	Franklin		LANDFILL:LOCAL	
BLANDFORD			SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
BRIMFIELD		SCRAM	REGIONAL LF:PALMER	
BUCKLAND	Franklin		LANDFILL:LOCAL	
CHARLEMONT	Franklin		PRIVATE LF:GRANBY	
CHESHIRE	North Berkshire		PRIVATE LF:GRANBY	
CHESTER			SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
CHESTERFIELD		HRMC	REGIONAL LF:NORTHAMPTON	
CHICOPEE			PRIVATE LF:CHICOPEE PARTYKA	
CLARKSBURG	North Berkshire		LANDFILL:LOCAL	
COLRAIN	Franklin		LANDFILL:LOCAL	
CONWAY			PRIVATE LF:GRANBY	
CUMMINGTON		HRMC	REGIONAL LF:NORTHAMPTON	
DALTON			COMBUSTION:PITTSFIELD	
DEERFIELD	Franklin		LANDFILL:LOCAL	
E LONGMEADOW			COMBUSTION:SPRINGFIELD	
EASTHAMPTON			REGIONAL LF:NORTHAMPTON	
EGREMONT	South Berkshire		SPOT:PRIVATE HAULER	GRANBY/PITTSFIELD
ERVING	Franklin		SPOT:PRIVATE HAULER	REG LF:GRANBY PARTYKA
FLORIDA	North Berkshire		SPOT:PRIVATE HAULER	UNKNOWN
GILL	Franklin		REGIONAL LF:BERNARDSTON	
GOSHEN			REGIONAL LF:NORTHAMPTON	
GRANBY			PRIVATE LF:GRANBY	
GRANVILLE			SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
GREENFIELD	Franklin		COMBUSTION:SPRINGFIELD	
GT BARRINGTON			LANDFILL:LOCAL	
HADLEY	East Hampshire		SPOT:PRIVATE HAULER	BARRE LF
HAMPDEN			LANDFILL:LOCAL	
HANCOCK	North Berkshire		COMBUSTION:PITTSFIELD	
HATFIELD		HRMC	REGIONAL LF:NORTHAMPTON	
HAWLEY	Franklin		SPOT:PRIVATE HAULER	REG LF:NORTHAMPTON

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
HEATH			COMBUSTION:SPRINGFIELD	
HINSDALE	North Berkshire		COMBUSTION:PITTSFIELD	
HOLLAND			LANDFILL:LOCAL	
HOLYOKE			PRIVATE LF:GRANBY	
HUNTINGTON		HRMC	REGIONAL LF:NORTHAMPTON	
LANESBOROUGH	North Berkshire		COMBUSTION:PITTSFIELD	
LEE	South Berkshire		COMBUSTION:PITTSFIELD	
LENOX			COMBUSTION:PITTSFIELD	
LEVERETT	East Hampshire		SPOT:PRIVATE HAULER	
LEYDEN	Franklin		REGIONAL LF:BERNARDSTON	
LONGMEADOW			COMBUSTION:SPRINGFIELD	
LUDLOW			COMBUSTION:SPRINGFIELD	
MIDDLEFIELD			REGIONAL LF:NORTHAMPTON	
MONROE			SPOT:PRIVATE HAULER	GRANBY/PITTSFLD
MONSON			SPOT:PRIVATE HAULER	REG LF:CHICOPEE PARTYK
MONTAGUE	Franklin		LANDFILL:LOCAL	
MONTEREY	South Berkshire		SPOT:PRIVATE HAULER	GRANBY/PITTSFIELD
MONTGOMERY			SPOT:PRIVATE HAULER	UNKNOWN
MT WASHINGTON	South Berkshire		SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
NEW ASHFORD	North Berkshire		REGIONAL LF:WILLIAMSTOWN	
NEW MARLBORO	South Berkshire		SPOT:PRIVATE HAULER	GRANBY/PITTSFLD
NEW SALEM	Franklin		REGIONAL LF:ORANGE	
NORTH ADAMS	North Berkshire		SPOT:PRIVATE HAULER	GRANBY/CHICOPEE
NORTHAMPTON			REGIONAL LF:NORTHAMPTON	
NORTHFIELD	Franklin		SPOT: PRIVATE HAULER	NEW HAMPSHIRE
ORANGE	Franklin		REGIONAL LF:ORANGE	
OTIS	South Berkshire		SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
PALMER			REGIONAL LF:PALMER	
PELHAM	East Hampshire		SPOT:PRIVATE HAULER	REG LF:AMHERST
PERU	North Berkshire		SPOT:PRIVATE HAULER	GRANBY/PITTSFLD
PITTSFIELD			COMBUSTION:PITTSFIELD	
PLAINFIELD		HRMC	REGIONAL LF:NORTHAMPTON	
RICHMOND			COMBUSTION:PITTSFIELD	
ROWE	Franklin		PRIVATE LF:GRANBY	
RUSSELL			SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
SANDISFIELD	South Berkshire	South Berkshire	SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
SAVOY	North Berkshire		REGIONAL LF:ADAMS	
SHEFFIELD	South Berkshire		SPOT:PRIVATE HAULER	GRANBY/PITTSFLD
SHELBURNE	Franklin		PRIVATE LF:PLAINVILLE	
SHUTESBURY	East Hampshire		REGIONAL LF:AMHERST	
SOUTH HADLEY			LANDFILL:LOCAL	
SOUTHAMPTON			LANDFILL:LOCAL	
SOUTHWICK			COMBUSTION:SPRINGFIELD	
SPRINGFIELD			COMBUSTION:SPRINGFIELD	
STOCKBRIDGE	South Berkshire		SPOT:PRIVATE HAULER	PRIVATE LF: GRANBY
SUNDERLAND	Franklin		REGIONAL LF:BERNARDSTON	
TOLLAND			SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
TYRINGHAM			COMBUSTION:PITTSFIELD	

DEP Communities	Regional Planning Affiliation	Regional Recycling Associations	Combustion or Landfill: Disposal Location or Private Hauler Disposal	Disposal Location: Cities & Towns Without Disposal Contract
W SPRINGFIELD			COMBUSTION:SPRINGFIELD	
W STOCKBRIDGE	South Berkshire		SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
WALES			SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
WARE		SCRAM	LANDFILL:LOCAL	
WARWICK	Franklin	Franklin	LANDFILL:LOCAL	
WASHINGTON			COMBUSTION:PITTSFIELD	
WENDELL	Franklin		SPOT:PRIVATE HAULER	MILLBURY/PITTSFLD
WESTFIELD			LANDFILL:LOCAL	
WESTHAMPTON		HRMC	LANDFILL:LOCAL	
WHATELY	Franklin		REGIONAL LF:NORTHAMPTON	
WILBRAHAM			COMBUSTION:SPRINGFIELD	
WILLIAMSBURG		HRMC	REGIONAL LF:NORTHAMPTON	
WILLIAMSTOWN	North Berkshire		REGIONAL LF:WILLIAMSTOWN	
WINDSOR	North Berkshire		SPOT:PRIVATE HAULER	GRANBY/PITTSFLD
WORTHINGTON		HRMC	REGIONAL LF:NORTHAMPTON	

KEY: Regional Planning Affiliation

ANAWAN - ANAWAN Regional Solid Waste Committee
Brookfield - Brookfield & Surrounding Communities
CCPEDC/Barn. - Cape Cod Planning & Economic Development Committee/Barnstable County
Car/Mar/Wareham - Carver/Marion/Wareham Regional Refuse Disposal District
CMRRC - Central Massachusetts Resource Recovery Committee
East Hampshire - East Hampshire Regional Refuse District
Franklin - Franklin County Solid Waste Management District
GNBRRMD - Greater New Bedford Regional Refuse District
MAGIC - Minuteman Advisory Group for Interlocal Coordination
Millis - Millis Consortium
Montachusett - Montachusett Regional Planning Commission
MVRDRRD - Martha's Vin
NESWC - Northeast Solid Waste Committee
NMAC - Northern Middlesex Area Commission
NE Essex - Northern Essex County Group
North Berkshire - Northern Berkshire Solid Waste Management District
North Shore - North Shore Communities
Shirley - Shirley & Surrounding Communities
South Berkshire - Southern Berkshire Solid Waste Management District
South Shore - South Shore Coalition

FOOTNOTES:

DISPOSAL LOCATIONS - Cities and Towns without Disposal Contracts. These communities have disposal contracts with private haulers (SPOT MARKET) who in turn have contracts with disposal locations.

APPENDIX J

SCOPE OF RECYCLING PROGRAM FOR MASSACHUSETTS MUNICIPALITIES FOR 1992: shows which municipality recycles which materials. This table also shows whether a municipality recycles at the curb or at a dropoff center, and, whether the program is mandatory or voluntary.

APPENDIX J: Scope of Residential Recycling Programs in Massachusetts for 1992

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
ABINGTON	Y	V	Y	N											Y	
ACTON	Y	V	N	Y	D	Y	Y	Y	Y		Y	Y	Y		Y	Y
ACUSHNET	Y	V	N	Y	C	Y	Y	Y		Y	Y					
ADAMS	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
AGAWAM	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	Y
ALFORD	Y	M	N	Y		Y	Y	Y	Y						Y	
AMESBURY	Y	V	N	N											Y	
AMHERST	Y	M	Y	N		Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
ANDOVER	Y	M	Y	N			Y	Y	Y		Y				Y	Y
ARLINGTON	Y	M	Y	N	C	Y	Y	Y	Y		Y	Y	Y		Y	Y
ASHBURNHAM	Y	M	Y	N	D	Y	Y	Y	Y	Y	Y	Y	Y	Y		
ASHBY	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y			
ASHFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
ASHLAND	Y	V	N	Y		Y	Y	Y	Y	Y	Y					
ATHOL	Y	M	Y	N		Y	Y	Y	Y	Y	Y	Y	Y		Y	Y
ATTLEBORO	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y		Y		Y	
AUBURN	N	V	Y	N		Y	Y		Y	Y					Y	
AVON	Y	V	N	Y	C	Y	Y	Y	Y		Y		Y		Y	Y
AYER	Y	V	N	Y		Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
BARNSTABLE	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y	Y	Y	
BARRE	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
BECKET	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
BEDFORD	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	Y
BELCHERTOWN	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	Y
BELLINGHAM	Y	M	N	Y		Y	Y	Y							Y	
BELMONT	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y	Y	Y	Y
BERKLEY	N		N	N			Y		Y		Y				Y	
BERLIN	Y	V	N	Y		Y	Y	Y	Y		Y				Y	
BERNARDSTON	N	V	N	Y			Y		Y	Y	Y		Y		Y	
BEVERLY	Y	M	Y	N		Y	Y	Y	Y						Y	Y
BILLERICA	Y	V	Y	N	C	Y	Y	Y	Y		Y	Y	Y	Y		
BLACKSTONE	Y	V	N	Y	C	Y	Y	Y	Y		Y		Y	Y	Y	Y
BLANDFORD	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
BOLTON	N	V	N	Y		Y	Y	Y	Y		Y				Y	
BOSTON	Y	V	N	Y		Y	Y	Y	Y		Y					
BOURNE	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y	Y	Y	Y
BOXBOROUGH	N	V	N	Y			Y	Y	Y		Y				Y	
BOXFORD	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	
BOYLSTON	Y	M	Y	N		Y	Y	Y	Y		Y		Y	Y	Y	Y
BRAINTREE	Y	V	Y	N	C	Y	Y	Y	Y		Y				Y	
BREWSTER	Y	V	N	Y		Y	Y	Y	Y	Y	Y	Y	Y		Y	
BRIDGEWATER	Y	M	N	Y			Y		Y		Y				Y	
BRIMFIELD	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
BROCKTON	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
BROOKFIELD	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y	Y	Y	
BROOKLINE	Y	M	Y	N		Y	Y	Y	Y		Y				Y	Y
BUCKLAND	Y	M	N	Y	C	Y	Y	Y	Y	Y	Y		Y		Y	
BURLINGTON	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y		Y	
CAMBRIDGE	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y		Y	Y
CANTON	Y	V	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	
CARLISLE	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
CARVER	Y	V	N	Y	D	Y	Y	Y	Y		Y				Y	
CHARLEMONT	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
CHARLTON	Y	V	N	Y		Y	Y		Y		Y				Y	
CHATHAM	Y	V	N	Y	D	Y	Y	Y		Y	Y	Y	Y		Y	
CHELMSFORD	Y	V	Y	N		Y	Y	Y	Y		Y				Y	Y
CHELSEA	Y	*	N	N	C	Y	Y	Y	Y		Y				Y	
CHESHIRE	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
CHESTER	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
CHESTERFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
CHICOPEE	Y	M	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CHILMARK	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
CLARKSBURG	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
CLINTON	Y	V	N	Y	C	Y	Y		Y		Y				Y	
COHASSET	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y	Y	Y	
COLRAIN	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
CONCORD	Y	Y	Y	N	C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CONWAY	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
CUMMINGTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
DALTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
DANVERS	Y	V	N	Y		Y		Y	Y			Y	Y	Y	Y	
DARTMOUTH	Y	V	N	Y		Y	Y	Y	Y		Y		Y		Y	Y
DEDHAM	Y	V	Y	N	C	Y	Y	Y	Y		Y		Y		Y	
DEERFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
DENNIS	Y	V	N	Y			Y		Y	Y	Y		Y			
DIGHTON	Y	V	N	Y		Y	Y	Y	Y						Y	
DOUGLAS	Y	V	N	Y		Y	Y	Y								
DOVER	Y	V	N	Y		Y	Y		Y			Y	Y	Y	Y	Y
DRACUT	N	V	N	Y												
DUDLEY	Y	M	N	Y											Y	
DUNSTABLE	Y	M	N	Y		Y	Y	Y	Y	Y	Y		Y	Y	Y	
DUXBURY	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y
EAST BRIDGEWAT	N		N	N		Y	Y	Y			Y				Y	
EAST BROOKFIELD	Y	M	N	Y	C								Y		Y	Y
EAST LONGMEADO	Y	M	Y	N		Y	Y	Y	Y	Y			Y		Y	Y
EASTHAM	Y	V	N	Y	D	Y	Y	Y	Y		Y	Y	Y	Y	Y	
EASTHAMPTON	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	
EASTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
EDGARTOWN	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
EGREMONT	Y	M	N	Y		Y	Y	Y	Y	Y	Y	Y		Y	Y	
ERVING	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	
ESSEX	Y	V	N	Y	D	Y	Y	Y	Y		Y	Y	Y		Y	
EVERETT	Y	M	N	Y	C	Y	Y	Y	Y		Y					
FAIRHAVEN	Y	V	Y	N	C	Y	Y	Y	Y	Y	Y	Y	Y		Y	
FALL RIVER	Y	V	N	Y					Y		Y				Y	
FALMOUTH	Y	V	Y	N		Y	Y	Y			Y		Y		Y	
FITCHBURG	N	V	Y	N		Y	Y	Y	Y	Y	Y				Y	
FLORIDA	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
FOXBOROUGH	Y	V	Y	N		Y	Y	Y	Y						Y	
FRAMINGHAM	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y		Y	Y
FRANKLIN	Y	M	Y	N	C	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
FREETOWN	Y	V	N	Y	C	Y	Y	Y	Y		Y	Y	Y	Y	Y	
GARDNER	Y	V	N	Y		Y	Y	Y	Y	Y	Y	Y			Y	Y
GAY HEAD	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
GEORGETOWN	Y	V	N	Y			Y		Y						Y	
GILL	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
GLOUCESTER	Y	V	N	Y	C	Y	Y	Y	Y		Y	Y	Y		Y	Y
GOSHEN	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
GOSNOLD	Y	M	N	Y												
GRAFTON	Y	M	Y	N		Y	Y	Y	Y						Y	
GRANBY	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
GRANVILLE	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
GREAT BARRINGT	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
GREENFIELD	Y	M	Y	N	p	Y	Y	Y	Y		Y	Y	Y		Y	Y
GROTON	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	
GROVELAND	Y	M	N	Y	C	Y	Y	Y	Y		Y		Y		Y	
HADLEY	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
HALIFAX	Y	M	Y	N	C	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
HAMILTON	Y	V	Y	N		Y	Y	Y	Y		Y				Y	Y
HAMPDEN	Y	V	N	Y		Y	Y	Y	Y		Y				Y	
HANCOCK	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
HANOVER	Y	M	N	Y	D	Y	Y	Y	Y		Y		Y	Y	Y	
HANSON	Y	V	N	Y	D	Y							Y	Y	Y	
HARDWICK	Y	V	N	Y		Y	Y	Y	Y	Y	Y		Y		Y	
HARVARD	Y	V	N	Y		Y	Y	Y	Y	Y	Y				Y	
HARWICH	Y	V	N	Y		Y	Y	Y	Y		Y		Y		Y	
HATFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
HAVERHILL	Y	V	N	Y	C	Y	Y	Y	Y		Y		Y			
HAWLEY	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
HEATH	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
HINGHAM	Y	M	N	Y		Y	Y	Y	Y	Y	Y	Y	Y		Y	
HINSDALE	Y	M	N	Y		Y	Y	Y	Y	Y					Y	

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
HOLBROOK	Y	V	N	Y	C	Y	Y	Y					Y		Y	
HOLDEN	N	M	Y	N		Y	Y	Y	Y		Y				Y	
HOLLAND	Y	V	N	Y											Y	
HOLLISTON	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y	Y	Y	Y
HOLYOKE	Y	M	Y	N		Y	Y	Y	Y	Y			Y		Y	Y
HOPEDALE	Y	M	N	Y		Y	Y		Y		Y	Y	Y		Y	
HOPKINTON	Y	V	N	Y		Y	Y	Y	Y	Y	Y				Y	Y
HUBBARDSTON	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y					
HUDSON	N	V	Y	N		Y	Y	Y	Y	Y	Y				Y	
HULL	N		N	N		Y	Y	Y	Y		Y					
HUNTINGTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
IPSWICH	Y	V	Y	N	C	Y	Y	Y	Y		Y		Y		Y	
KINGSTON	Y	M	N	Y			Y	Y			Y				Y	
LAKEVILLE	Y	M	N	Y		Y	Y	Y	Y		Y		Y	Y	Y	Y
LANCASTER	Y	V	N	Y	C	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
LANESBOROUGH	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
LAWRENCE	N	V	Y	N					Y						Y	
LEE	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	
LEICESTER	Y	V	N	Y	C	Y	Y	Y	Y		Y	Y	Y	Y	Y	
LENOX	Y	M	Y	N		Y	Y	Y	Y	Y					Y	
LEOMINSTER	Y	V	N	Y	C				Y	Y			Y			
LEVERETT	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
LEXINGTON	Y	M	Y	N		Y	Y	Y	Y		Y			Y	Y	Y
LEYDEN	Y	M	N	Y			Y		Y	Y	Y		Y		Y	
LINCOLN	Y	V	N	Y	D	Y	Y	Y	Y				Y		Y	Y
LITTLETON	Y	V	N	Y	D		Y	Y	Y		Y	Y	Y		Y	
LONGMEADOW	Y	V	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
LOWELL	Y	V	Y	N		Y	Y	Y	Y		Y		Y		Y	Y
LUDLOW	Y	M	Y	N	C	Y	Y	Y	Y	Y		Y	Y		Y	Y
LUNENBURG	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y				Y	
LYNN	Y	V	N	Y	C	Y	Y	Y	Y		Y		Y		Y	
LYNNFIELD	Y	V	N	Y		Y	Y	Y	Y	Y	Y				Y	
MALDEN	Y	V	Y	N		Y	Y	Y	Y		Y				Y	
MANCHESTER	Y	M	Y	N		Y	Y	Y	Y	Y	Y					
MANSFIELD	Y	V	N	Y		Y	Y	Y	Y		Y				Y	
MARBLEHEAD	Y	M	Y	N	C	Y	Y	Y	Y		Y	Y	Y		Y	Y
MARION	Y	V	Y	N	C	Y	Y	Y	Y		Y				Y	
MARLBOROUGH	N	V	N	Y		Y	Y	Y	Y	Y	Y				Y	
MARSHFIELD	Y	V	Y	N		Y	Y	Y	Y	Y	Y	Y	Y		Y	
MASHPEE	Y	V	N	Y		Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
MATTAPOISETT	N	V	N	Y		Y	Y	Y			Y				Y	
MAYNARD	Y	V	N	Y	C	Y	Y	Y	Y		Y				Y	
MEDFIELD	Y	M	Y	N		Y	Y		Y				Y		Y	Y
MEDFORD	Y	M	Y	N	C	Y	Y	Y	Y		Y				Y	

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
MEDWAY	Y	M	Y	N	C	Y	Y	Y	Y		Y				Y	Y
MELROSE	Y	V	Y	N	C	Y	Y	Y	Y		Y				Y	
MENDON	Y	M	Y	N	C		Y		Y				Y		Y	
MERRIMAC	Y	M	N	Y	D	Y		Y	Y				Y	Y	Y	
METHUEN	Y	V	Y	N					Y						Y	
MIDDLEBOROUGH	Y	M	N	Y	C	Y	Y		Y		Y	Y	Y		Y	
MIDDLEFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
MIDDLETON	Y	M	N	Y	D	Y	Y	Y	Y		Y		Y		Y	Y
MILFORD	Y	M	Y	N	C	Y	Y	Y	Y		Y				Y	
MILLBURY	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y		Y	
MILLIS	Y	M	N	Y		Y	Y	Y	Y		Y		Y	Y	Y	Y
MILLVILLE	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y					
MILTON	Y	M	Y	N		Y	Y	Y	Y		Y				Y	
MONROE	Y	M	Y	N	C	Y	Y	Y	Y	Y					Y	
MONSON	Y	M	Y	N		Y	Y	Y	Y	Y						
MONTAGUE	Y	M	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MONTEREY	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
MONTGOMERY	N	M	Y	N		Y	Y	Y	Y	Y					Y	
MOUNT WASHINGT	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
NAHANT	Y	V	Y	N	C	Y	Y	Y	Y		Y				Y	
NANTUCKET	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
NATICK	Y	M	N	Y	C	Y	Y	Y	Y	Y	Y		Y		Y	
NEEDHAM	Y	M	N	Y	D	Y	Y	Y	Y	Y			Y		Y	Y
NEW ASHFORD	Y	M	N	Y		Y	Y	Y	Y	Y						
NEW BEDFORD	Y	V	Y	N	C	Y	Y		Y		Y				Y	
NEW BRAINTREE	Y	V	N	Y											Y	
NEW MARLBOROU	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
NEW SALEM	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
NEWBURY	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y		Y			Y
NEWBURYPORT	Y	V	N	Y	C	Y	Y	Y	Y		Y				Y	
NEWTON	Y	M	Y	N		Y	Y	Y	Y	Y	Y	Y			Y	Y
NORFOLK	Y	V	N	Y		Y	Y	Y	Y	Y	Y				Y	
NORTH ADAMS	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
NORTH ANDOVER	Y	M	N	Y	C	Y	Y	Y	Y		Y				Y	Y
NORTH ATTLEBOR	Y	V	Y	N	C	Y	Y	Y	Y		Y	Y			Y	Y
NORTH BROOKFIE	Y	M	Y	N	D	Y	Y	Y	Y		Y		Y		Y	
NORTH READING	Y	M	N	Y					Y						Y	
NORTHAMPTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NORTHBOROUGH	Y	M	Y	N		Y	Y	Y			Y				Y	
NORTHBRIDGE	Y	V	N	Y	D	Y	Y		Y		Y				Y	Y
NORTHFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
NORTON	Y	V	N	Y		Y	Y	Y	Y						Y	
NORWELL	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	
NORWOOD	Y	V	Y	N		Y	Y	Y	Y		Y	Y	Y		Y	Y

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
OAK BLUFF	Y	M	N	Y	C	Y	Y	Y	Y	Y	Y		Y		Y	
OAKHAM	Y	V	N	Y											Y	
ORANGE	Y	M	Y	N		Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
ORLEANS	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
OTIS	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
OXFORD	Y	V	N	Y		Y	Y	Y	Y		Y				Y	
PALMER	Y	M	N	Y		Y	Y	Y	Y							
PAXTON	Y	M	Y	N	C	Y	Y	Y	Y							
PEABODY	Y	V	N	Y	C	Y	Y	Y	Y		Y	Y	Y		Y	
PELHAM	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
PEMBROKE	Y	M	N	Y	C	Y	Y	Y	Y		Y		Y		Y	
PEPPERELL	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y	Y	Y	Y		
PERU	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
PETERSHAM	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
PHILLIPSTON	Y	M	N	Y											Y	
PITTSFIELD	Y	M	Y	N		Y	Y	Y	Y	Y	Y		Y		Y	Y
PLAINFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
PLAINVILLE	Y	V	Y	N		Y	Y	Y	Y		Y				Y	
PLYMOUTH	Y	V	N	Y		Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
PLYMPTON	Y	V	N	Y											Y	
PRINCETON	Y	V	Y	N	D	Y	Y	Y	Y	Y	Y				Y	
PROVINCETOWN	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y	Y	Y	
QUINCY	Y	M	Y	N			Y		Y		Y				Y	
RANDOLPH	N	V	N	Y											Y	
RAYNHAM	N	V	N	Y		Y	Y	Y	Y		Y				Y	
READING	Y	M	Y	N	C	Y	Y	Y	Y		Y	Y		Y	Y	Y
REHOBOTH	Y	V	N	Y	D	Y	Y	Y	Y		Y				Y	
REVERE	Y	M	Y	N	D	Y	Y	Y	Y		Y		Y		Y	
RICHMOND	Y	M	Y	N		Y	Y	Y	Y	Y			Y		Y	
ROCHESTER	Y	V	N	Y	C		Y		Y		Y					
ROCKLAND	N	V	N	Y		Y	Y	Y	Y	Y	Y		Y		Y	
ROCKPORT	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
ROWE	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
ROWLEY	Y	V	N	Y	C	Y	Y	Y	Y		Y				Y	
ROYALSTON	Y	M	N	Y		Y		Y							Y	
RUSSELL	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
RUTLAND	Y	V	N	Y		Y	Y								Y	
SALEM	Y	V	Y	N			Y		Y		Y		Y			
SALISBURY	Y	V	N	Y	D	Y	Y	Y	Y		Y	Y				
SANDISFIELD	Y	V	N	Y		Y	Y	Y	Y						Y	
SANDWICH	Y	V	N	Y		Y	Y	Y	Y			Y	Y	Y	Y	
SAUGUS	Y	V	N	Y	C				Y	Y	Y				Y	
SAVOY	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
SCITUATE	Y	M	N	Y	D	Y	Y	Y	Y		Y		Y		Y	

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
SEEKONK	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	Y
SHARON	Y	V	Y	N	D	Y	Y	Y	Y		Y	Y	Y	Y	Y	
SHEFFIELD	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
SHELBURNE	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
SHERBORN	Y	V	N	Y		Y	Y	Y	Y				Y			
SHIRLEY	Y	V	N	Y		Y	Y		Y		Y				Y	Y
SHREWSBURY	Y	V	N	Y		Y	Y	Y	Y		Y					
SHUTESBURY	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
SOMERSET	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y	Y	Y	
SOMERVILLE	Y	V	Y	N	C	Y	Y	Y	Y		Y		Y		Y	
SOUTH HADLEY	Y	M	Y	N	C	Y	Y	Y	Y	Y			Y	Y	Y	
SOUTHAMPTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
SOUTHBOROUGH	Y	V	N	Y	D	Y	Y	Y	Y				Y			
SOUTHBRIDGE	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	
SOUTHWICK	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
SPENCER	Y	M	N	Y	D	Y	Y		Y	Y	Y		Y	Y	Y	
SPRINGFIELD	Y	M	Y	N		Y	Y	Y	Y	Y	Y				Y	Y
STERLING	Y	V	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	
STOCKBRIDGE	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
STONEHAM	Y	V	N	Y		Y	Y	Y	Y		Y				Y	
STOUGHTON	Y	V	Y	N		Y	Y	Y			Y				Y	
STOW	N	M	N	Y	D	Y	Y	Y	Y		Y		Y		Y	
STURBRIDGE	Y	M	N	Y	D	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y
SUDBURY	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUNDERLAND	Y	M	Y	N		Y	Y	Y	Y	Y	Y					
SUTTON	N	V	N	Y		Y	Y	Y	Y		Y				Y	
SWAMPSCOTT	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y		Y	Y
SWANSEA	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y	Y	Y	
TAUNTON	Y	M	Y	N		Y	Y	Y	Y		Y	Y	Y		Y	Y
TEMPLETON	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y	Y	Y	
TEWKSBURY	Y	M	Y	N		Y	Y	Y	Y				Y		Y	Y
TISBURY	Y	M	Y	N	D	Y	Y	Y	Y	Y	Y		Y		Y	
TOLLAND	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
TOPSFIELD	Y	M	N	Y	C	Y	Y	Y	Y		Y		Y		Y	
TOWNSEND	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y		Y	Y	Y	
TRURO	Y	V	N	Y		Y	Y	Y			Y	Y	Y		Y	
TYNGSBOROUGH	Y	V	Y	N		Y	Y	Y	Y	Y	Y					
TYRINGHAM	N		N	N												
UPTON	N		N	N			Y								Y	
UXBRIDGE	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y		Y	Y	Y	
WAKEFIELD	Y	M	Y	N		Y	Y	Y	Y						Y	Y
WALES	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
WALPOLE	Y	M	Y	N	C	Y	Y	Y	Y	Y	Y		Y		Y	Y
WALTHAM	Y	V	Y	N	C	Y	Y	Y	Y		Y		Y		Y	

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												
WARE	Y	M	N	Y		Y	Y	Y	Y	Y						
WAREHAM	Y	V	Y	N					Y							
WARREN	Y	M	N	Y	D	Y	Y		Y		Y		Y			
WARWICK	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
WASHINGTON	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
WATERTOWN	Y	V	N	Y	C	Y	Y	Y	Y						Y	
WAYLAND	Y	M	N	Y		Y	Y	Y	Y		Y		Y		Y	
WEBSTER	Y	V	N	Y		Y	Y	Y	Y	Y	Y				Y	
WELLESLEY	Y	V	N	Y	D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WELLFLEET	Y	M	N	Y	C	Y	Y	Y	Y	Y	Y		Y		Y	
WENDELL	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
WENHAM	Y	V	Y	N	C	Y	Y	Y	Y		Y		Y		Y	Y
WEST BOYLSTON	Y	V	Y	N		Y	Y	Y	Y		Y				Y	
WEST BRIDGEWAT	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y		Y	
WEST BROOKFIEL	Y	M	N	Y		Y	Y	Y	Y		Y				Y	
WEST NEWBURY	Y	V	N	Y		Y	Y	Y	Y		Y				Y	
WEST SPRINGFIEL	Y	M	Y	N		Y	Y	Y	Y	Y			Y	Y	Y	Y
WEST STOCKBRID	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
WEST TISBURY	Y	M	N	Y	D	Y	Y	Y	Y	Y	Y		Y		Y	
WESTBOROUGH	Y	V	N	Y		Y	Y	Y	Y	Y	Y				Y	
WESTFIELD	Y	M	Y	N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WESTFORD	Y	V	Y	N		Y	Y	Y	Y		Y				Y	Y
WESTHAMPTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
WESTMINSTER	Y	V	Y	N		Y	Y	Y	Y	Y	Y				Y	
WESTON	Y	V	N	Y		Y	Y	Y	Y			Y	Y		Y	Y
WESTPORT	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y	Y	Y	
WESTWOOD	Y	V	N	Y			Y		Y	Y	Y	Y			Y	
WEYMOUTH	Y	M	Y	N	C	Y	Y	Y	Y		Y		Y	Y	Y	Y
WHATELY	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
WHITMAN	N		N	N											Y	
WILBRAHAM	Y	M	N	Y		Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
WILLIAMSBURG	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
WILLIAMSTOWN	Y	M	N	Y		Y	Y	Y	Y	Y	Y				Y	
WILMINGTON	Y	V	N	Y	C	Y	Y	Y	Y	Y	Y		Y		Y	
WINCHENDON	Y	V	N	Y	D	Y	Y	Y	Y		Y		Y			
WINCHESTER	Y	V	N	Y	D	Y	Y	Y	Y				Y		Y	Y
WINDSOR	Y	M	N	Y		Y	Y	Y	Y	Y					Y	
WINTHROP	Y	V	Y	N	C		Y	Y	Y		Y				Y	
WOBURN	Y	V	Y	N	C	Y	Y	Y	Y		Y	Y	Y	Y	Y	
WORCESTER	Y	V	N	Y	C	Y	Y		Y		Y				Y	
WORTHINGTON	Y	M	N	Y		Y	Y	Y	Y	Y	Y					
WRENTHAM	Y	M	N	Y	C	Y	Y	Y	Y	Y	Y	Y	Y		Y	
YARMOUTH	Y	V	N	Y	D		Y		Y	Y		Y	Y	Y	Y	

TOWN	RECYCLE	RECYCLE			REFUSE CURB OR DROP	STEEL	GLASS	ALUM	NEWS	CORRU-GATED	PLASTIC	SLABS	WHITE GOODS	TIRES	LEAVES	YARD WASTE
		M/V	CURB	DROP												

NOTES:

1. SLABS are spent lead-acid batteries.

2. M/V refers to mandatory or voluntary program.

3. Curb or Drop; for recycling and for refuse collection, some communitiesuse both forms of collection, however this database selects one or the other based on an estimate of which is the predominant collection method.

DATA SOURCES:

Alternative Resources Inc.,; data from Phase I Recycling Need Analysis for Millis Consortium, August 1990.
ANAWAN, the regional solid waste management planning association for the greater Attleboro area; data from March 1989 internal survey.
Coalition for North Central Waste Management (Worcester County); data from CONCEWM meeting minutes of 1989-1990.
Division of Local Mandates municipal recycling survey of 1991-92.
Franklin County Solid Waste Management District; Information from May 1992 phone interview of District Administrator and from 1990 FC Solid Waste Management Plan.
Data from DSWM's September 1990 "Curbside Programs in Mass. Cities and Towns," and "Dropoff Programs in Mass. Cities and Towns."
Data from January 1992 DSWM report "Recycling Programs in Mass. Cities and Towns."
Hilltown Resource Management Cooperative (HRMC); data from HRMC newsletters on file.
Data from DSWM staff' direct knowledge of specified community's recycling program.
Mass. Municipal Association (MMA) Municipal Recycling and Solid Waste Fees Survey (1990).
Mass. Municipal Association (MMA) survey of municipal recycling attached to it's 1992 technical assistance grant program applications.
Middlesex News survey of certain Middlesex County communities on recycling program status (Spring 1991)
Springfield Material Recovery Facility; data from MRF program records.
Northern Berkshire SWM District (NBSWMD); plastics program info. for memmber towns from May 1992 phone conversation with District secretary.
North Shore Recycling, a newsletter put together by Natalie Roy regarding recycling efforts of communities on Boston's north shore.
Recycling equipment grants (second annual cycle - 1992). Grant application required provision of data on municipality's recycling program.
Resource Integration Systems; data from this DEP consultant's report, "Regional Recycling alternatives for Barnstable County," (April 1991)
Science Applications International Corp. (SAIC); data from this DEP consultant's report, "RFP for Recycling Services for Central Mass. Resource Recovery Committee (CMRCC)," (August 5, 1991
Tellus Institute; data from this South Shore Coalition consultant's report, "Phase I Solid Waste Management Plan for South Shore Coalition," (October 1990)

APPENDIX K

MASSACHUSETTS RECYCLING RATES BY MATERIAL FOR 1992: presents, material by material, the number of municipalities recycling, the population of these municipalities, the tons they generate, the tons they recycle through municipal programs, the tons they recycle through the bottle bill and the overall recycling rate. Data is presented for Springfield MRF and non-MRF communities and is broken down by curbside and dropoff programs.

APPENDIX K: Massachusetts Residential Recycling Rates by Material for 1992

Recyclable Material Category	Number of Municipalities (2)	Population (3)	Residential MSW Generation	Tons Generated of this Material (4)	Tons Recycled Via Municipal Collection (5)	Tons Recycled Via Bottle Bill (6)	Recycling Rate of this Material
GLASS							
MRF MUNI'S [All]	92	772,282	321,621	25,730	8,676	4,761	0.522
[Curb]	21	540,612	228,521	18,282	5,728	3,333	0.496
[Drop]	71	231,670	93,101	7,448	2,948	1,428	0.588
OTHER MUNI'S [All]	157	3,085,261	1,450,112	116,009	15,916	19,021	0.301
RECYCLIN [Curb]	60	1,391,926	646,474	51,718	8,639	8,581	0.333
(With Data) [Drop]	97	1,693,335	803,638	64,291	7,277	10,439	0.276
OTHER MUNI'S [All]	57	1,096,876	519,835	41,587	4,855	6,762	0.279
RECYCLIN [Curb]	22	610,530	314,255	25,140	3,300	3,764	0.281
(No Data) [Drop]	35	486,346	205,580	16,446	1,555	2,998	0.277
- SUBTOTAL OF RECYCLING	306	4,954,419	2,291,568	183,325	29,447	30,544	0.327
MUNI'S NOT RECYCLING	45	1,233,434	571,686	45,735	0	7,604	0.166
TOTALS	351	6,187,853	2,863,254	229,060	29,447	38,148	0.295

APPENDIX K: Massachusetts Residential Recycling Rates by Material for 1992

Recyclable Material Category	Number of Municipalities (2)	Population (3)	Residential MSW Generation	Tons Generated of this Material (4)	Tons Recycled Via Municipal Collection (5)	Tons Recycled Via Bottle Bill (6)	Recycling Rate of this Material
ALUMINUM							
MRF MUNI'S [All]	92	772,282	321,621	4,085	124	2,730	0.699
[Curb]	21	540,612	228,521	2,902	82	1,911	0.687
[Drop]	71	231,670	93,101	1,182	42	819	0.728
OTHER MUNI'S [All]	93	1,855,670	793,394	10,076	421	6,560	0.693
RECYCLIN [Curb]	34	1,105,335	355,287	4,260	286	3,907	0.984
(With Data) [Drop]	59	750,335	438,107	5,257	135	2,652	0.530
OTHER MUNI'S [All]	104	2,066,052	1,027,806	13,053	320	7,303	0.584
RECYCLIN [Curb]	43	1,122,661	562,004	6,744	187	3,969	0.616
(No Data) [Drop]	61	943,391	465,802	5,590	133	3,335	0.620
- SUBTOTAL OF RECYCLING	289	4,694,004	2,142,821	27,214	865	16,593	0.642
MUNI'S NOT RECYCLING	62	1,493,849	720,433	9,149	0	5,281	0.577
TOTALS	351	6,187,853	2,863,254	36,363	865	21,874	0.625

APPENDIX K: Massachusetts Residential Recycling Rates by Material for 1992

Recyclable Material Category	Number of Municipalities (2)	Population (3)	Residential MSW Generation	Tons Generated of this Material (4)	Tons Recycled Via Municipal Collection (5)	Tons Recycled Via Bottle Bill (6)	Recycling Rate of this Material
PAPER (4)							
MRF MUNI'S [All]	85	772,282	334,680	94,714	28,589	----	0.302
[Curb]	21	540,612	228,521	64,671	18,875		0.292
[Drop]	64	231,670	93,101	26,348	9,714		0.369
OTHER MUNI'S [All]	165	3,787,855	1,749,098	494,995	82,683	----	0.167
RECYCLIN [Curb]	63	1,580,719	749,619	212,142	51,455		0.243
(With Data) [Drop]	102	2,207,136	999,479	282,853	31,228		0.110
OTHER MUNI'S [All]	45	769,078	390,801	110,597	17,507	----	0.158
RECYCLIN [Curb]	15	368,849	184,218	52,134	11,052		0.238
(No Data) [Drop]	30	400,229	206,583	58,463	6,455		0.108
- SUBTOTAL OF RECYCLING	295	5,329,215	2,474,579	700,306	128,779	0	0.184
MUNI'S NOT RECYCLING	56	858,638	388,675	109,995	0	----	0.000
TOTALS	351	6,187,853	2,863,254	810,301	128,779	0	0.159

APPENDIX K: Massachusetts Residential Recycling Rates by Material for 1992

Recyclable Material Category	Number of Municipalities (2)	Population (3)	Residential MSW Generation	Tons Generated of this Material (4)	Tons Recycled Via Municipal Collection (5)	Tons Recycled Via Bottle Bill (6)	Recycling Rate of this Material
PLASTIC							
MRF MUNI'S	6	0	0	0	42	0	0
OTHER MUNI'S [All]	154	3,392,576	1,545,703	72,648	2,302	4,088	0.088
RECYCLIN [Curb]	52	1,329,677	629,364	29,580	1,400	1,602	0.101
(With Data) [Drop]	102	2,062,899	916,339	43,068	902	2,486	0.079
OTHER MUNI'S [All]	65	1,197,465	574,852	27,018	992	1,443	0.090
RECYCLIN [Curb]	29	711,180	334,082	15,702	743	857	0.102
(No Data) [Drop]	36	486,285	240,770	11,316	249	586	0.074
- SUBTOTAL OF RECYCLING	225	4,590,041	2,120,555	99,666	3,336	5,531	0.089
MUNI'S NOT RECYCLING	126	1,597,812	742,699	34,907	0	1,925	0.055
TOTALS	351	6,187,853	2,863,254	134,573	3,336	7,456	0.080

Recyclable Material Category	Number of Municipalities (2)	Population (3)	Residential MSW Generation	Tons Generated of this Material (4)	Tons Recycled Via Municipal Collection (5)	Tons Recycled Via Bottle Bill (6)	Recycling Rate of this Material
STEEL							
MRF MUNI'S [All]	92	772,282	321,621	12,865	3,511	0	0.273
[Curb]	21	540,612	228,521	9,141	2,318	0	0.254
[Drop]	71	231,670	93,101	3,724	1,193	0	0.320
OTHER MUNI'S [All]	128	2,602,405	1,208,362	48,576	3,030	0	0.062
RECYCLIN [Curb]	46	977,464	471,078	18,937	1,627	0	0.086
(With Data) [Drop]	82	1,624,941	737,284	29,639	1,403	0	0.047
OTHER MUNI'S [All]	77	1,359,138	678,759	27,150	1,803	0	0.066
RECYCLIN [Curb]	31	874,007	433,121	17,325	1,389	0	0.080
(No Data) [Drop]	46	485,131	245,638	9,826	414	0	0.042
- SUBTOTAL OF RECYCLING	297	4,733,825	2,208,742	88,591	8,344	0	0.094
MUNI'S NOT RECYCLING	54	1,454,028	654,512	25,939	0	0	0.000
TOTALS	351	6,187,853	2,863,254	114,530	8,344	0	0.073
GRAND TOTALS	351	6,187,853	2,863,254	1,324,828	170,771	67,479	0.180 0.083

APPENDIX K: Massachusetts Residential Recycling Rates by Material for 1992

Recyclable Material Category	Number of Municipalities (2)	Population (3)	Residential MSW Generation	Tons Generated of this Material (4)	Tons Recycled Via Municipal Collection (5)	Tons Recycled Via Bottle Bill (6)	Recycling Rate of this Material

NOTES:

1. The total residential recycling rate shown in the **Grand Total** row is less than the same rate shown in Appendix C. because this table does not include 350,000 tons of composted material and 60,000 tons of recycled white goods.
2. For each cluster of municipalities (i.e., MRF municipalities, other municipalities reporting data, other municipalities not reporting), the "[All]" values represent the total of "[Curb]" and "[Drop]" municipality values.
3. Population figures are interpolations using MISER population projections for 1995 and 1990 federal census estimates. They have also been adjusted, for the Cape Cod and Island communities, to include the impact of seasonal population influx.
4. "Tons Generated of this Material" is based on residential waste composition values from "Characterization of Municipal Solid Waste in the United States, 1992 Update," prepared for the U.S. EPA by Franklin Associates Ltd.
5. The tonnage of recyclables collected from municipal sources are derived primarily from 1992 DSWM equipment grant applications, a 1992 Massachusetts Municipal Association survey, a 1992 Division of Local Mandates surveys, and Springfield MRF reports for 1992. Steel numbers are for steel containers only. It is estimated through a separate procedure that 60,000 tons per year of white goods are recovered from municipal sources.
6. Recovery levels for container redemption law materials (i.e., "bottle bill") are based on Department of Revenue' industry deposit and redemption reports, Franklin Associates LTD reported data on container weights, and DSWM staff analysis of container market share.

APPENDIX L

MASSACHUSETTS POPULATION PROJECTIONS: presents a listing of each Massachusetts community, its population for 1990, estimated population for 1992, and projected population for 1996, 2000 and 2002. Population figures include tourism data where possible.

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
ABINGTON	13,817		13,775	13,732	13,711		13,690	13,606		13,565
ACTON	17,872		18,122	18,371	18,496		18,621	19,121		19,371
ACUSHNET	9,554		9,575	9,596	9,606		9,617	9,658		9,679
ADAMS	9,445		9,450	9,455	9,458		9,461	9,473		9,479
AGAWAM	27,323		27,602	27,881	28,021		28,161	28,721		29,000
ALFORD	418		424	429	432		435	448		454
AMESBURY	14,997		15,232	15,467	15,585		15,703	16,175		16,411
AMHERST	35,228		34,850	34,471	34,282		34,093	33,338		32,960
ANDOVER	29,151		29,093	29,034	29,005		28,976	28,859		28,801
ARLINGTON	44,630		44,213	43,796	43,588		43,380	42,546		42,129
ASHBURNHAM	5,433		5,667	5,902	6,019		6,136	6,606		6,841
ASHBY	2,717		2,971	3,225	3,352		3,479	3,988		4,242
ASHFIELD	1,715		1,775	1,834	1,864		1,894	2,013		2,073
ASHLAND	12,066		12,502	12,938	13,156		13,374	14,247		14,683
ATHOL	11,451		11,547	11,644	11,692		11,740	11,934		12,031
ATTLEBORO	38,383		38,065	37,746	37,587		37,428	36,792		36,474
AUBURN	15,005		14,956	14,907	14,883		14,859	14,763		14,714
AVON	4,558		4,658	4,759	4,809		4,859	5,060		5,161
AYER	6,871		6,883	6,896	6,902		6,909	6,935		6,948
BARNSTABLE	40,949	52,141	54,044 T	55,947	44,671		57,850	48,393	61,655	63,558
BARRE	4,546		4,756	4,965	5,070		5,175	5,595		5,805
BECKET	1,481		1,700	1,918	2,027		2,137	2,574		2,792
BEDFORD	12,996		13,100	13,203	13,255		13,307	13,516		13,620
BELCHERTOWN	10,579		11,175	11,771	12,069		12,367	13,560		14,156
BELLINGHAM	14,877		15,189	15,501	15,656		15,812	16,436		16,748
BELMONT	24,720		24,574	24,429	24,356		24,283	23,992		23,846
BERKLEY	4,237		4,427	4,617	4,712		4,807	5,187		5,378
BERLIN	2,293		2,311	2,329	2,338		2,347	2,384		2,402
BERNARDSTON	2,048		2,070	2,091	2,102		2,113	2,156		2,178
BEVERLY	38,195		38,100	38,005	37,957		37,909	37,719		37,624
BILLERICA	37,609		38,399	39,189	39,584		39,979	41,561		42,351
BLACKSTONE	8,023		8,223	8,422	8,522		8,622	9,021		9,221
BLANDFORD	1,187		1,251	1,315	1,347		1,379	1,509		1,574
BOLTON	3,134		3,230	3,325	3,373		3,421	3,614		3,710
BOSTON	574,283		582,107	589,931	593,843		597,756	613,404		621,228
BOURNE	16,064	22,046	22,842 T	23,637	17,934		24,432	19,805	26,023	26,818
BOXBOROUGH	3,343		3,445	3,547	3,598		3,649	3,853		3,956
BOXFORD	6,266		6,580	6,893	7,050		7,207	7,836		8,150
BOYLSTON	3,517		3,573	3,629	3,656		3,684	3,796		3,852
BRAINTREE	33,836		34,295	34,754	34,983		35,212	36,130		36,589
BREWSTER	8,440	13,333	14,189 T	15,044	10,083		15,899	11,727	17,610	18,466
BRIDGEWATER	21,249		21,203	21,158	21,135		21,112	21,021		20,976

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
BRIMFIELD	3,001		3,157	3,314	3,392		3,470	3,784		3,941
BROCKTON	92,788		91,404	90,021	89,329		88,637	85,870		84,487
BROOKFIELD	2,968		3,051	3,134	3,175		3,217	3,382		3,465
BROOKLINE	54,718		53,898	53,079	52,669		52,259	50,620		49,801
BUCKLAND	1,928		1,995	2,062	2,096		2,130	2,264		2,331
BURLINGTON	23,302		23,372	23,442	23,476		23,511	23,651		23,721
CAMBRIDGE	95,802		95,126	94,450	94,112		93,774	92,423		91,747
CANTON	18,530		18,909	19,289	19,478		19,668	20,427		20,806
CARLISLE	4,333		4,553	4,772	4,882		4,992	5,432		5,651
CARVER	10,590		11,589	12,589	13,088		13,588	15,587		16,586
CHARLEMONT	1,249		1,307	1,366	1,395		1,424	1,542		1,601
CHARLTON	9,576		9,846	10,116	10,251		10,386	10,926		11,196
CHATHAM	6,579	11,242	11,491 T	11,740	7,077		11,989	7,576	12,487	12,736
CHELMSFORD	32,383		32,907	33,431	33,694		33,956	35,004		35,528
CHELSEA	28,710		27,859	27,009	26,583		26,158	24,457		23,606
CHESHIRE	3,479		3,577	3,674	3,723		3,772	3,969		4,067
CHESTER	1,280		1,305	1,330	1,342		1,355	1,405		1,430
CHESTERFIELD	1,048		1,236	1,424	1,518		1,612	1,989		2,178
CHICOPEE	56,632		56,977	57,322	57,495		57,668	58,359		58,705
CHILMARK	650	1,652	1,707 T	1,761	721	1,789	1,953	794		2,117
CLARKSBURG	1,745		1,768	1,791	1,803		1,815	1,861		1,884
CLINTON	13,222		13,084	12,947	12,878		12,810	12,536		12,399
COHASSET	7,075		7,341	7,606	7,739		7,872	8,404		8,669
COLRAIN	1,757		1,793	1,829	1,847		1,865	1,939		1,976
CONCORD	17,076		17,425	17,775	17,949		18,124	18,822		19,172
CONWAY	1,529		1,593	1,658	1,690		1,723	1,853		1,918
CUMMINGTON	785		865	945	985		1,025	1,186		1,266
DALTON	7,155		7,029	6,902	6,839		6,776	6,524		6,397
DANVERS	24,174		24,407	24,640	24,757		24,874	25,342		25,576
DARTMOUTH	27,244		27,436	27,629	27,725		27,821	28,206		28,399
DEDHAM	23,782		23,887	23,991	24,043		24,096	24,305		24,409
DEERFIELD	5,018		5,079	5,140	5,171		5,202	5,325		5,387
DENNIS	13,864	27,299	27,898 T	28,498	15,400		29,097	16,936	30,296	30,896
DIGHTON	5,631		5,713	5,795	5,836		5,877	6,043		6,126
DOUGLAS	5,438		5,549	5,659	5,714		5,770	5,991		6,101
DOVER	4,915		5,056	5,197	5,268		5,339	5,622		5,764
DRACUT	25,594		26,586	27,578	28,073		28,569	30,553		31,545
DUDLEY	9,540		9,595	9,650	9,677		9,705	9,816		9,871
DUNSTABLE	2,236		2,363	2,490	2,553		2,617	2,871		2,998
DUXBURY	13,895		14,266	14,637	14,823		15,009	15,753		16,125
EAST BRIDGEWATER	11,104		11,077	11,050	11,037		11,024	10,971		10,945
EAST BROOKFIELD	2,033		2,016	1,999	1,990		1,982	1,948		1,931
EAST LONGMEADOW	13,367		13,404	13,442	13,460		13,479	13,553		13,591

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
EASTHAM	4,462	9,212	9,591 T	9,969	5,294		10,348	6,126	11,105	11,484
EASTHAMPTON	15,537		15,825	16,114	16,258		16,402	16,980		17,269
EASTON	19,807		20,064	20,320	20,448		20,577	21,090		21,346
EDGARTOWN	3,062	10,209	10,678 T	11,147	3,578	11,381	12,788	4,095		14,194
EGREMONT	1,229		1,291	1,354	1,385		1,416	1,541		1,603
ERVING	1,372		1,438	1,504	1,537		1,570	1,703		1,769
ESSEX	3,260		3,241	3,223	3,213		3,204	3,166		3,148
EVERETT	35,701		35,444	35,187	35,058		34,930	34,417		34,160
FAIRHAVEN	16,132		16,066	16,000	15,967		15,935	15,803		15,737
FALL RIVER	92,703		91,379	90,054	89,392		88,730	86,083		84,759
FALMOUTH	27,960	39,286	40,182 T	41,078	29,743		41,974	31,527	43,766	44,662
FITCHBURG	41,194		40,787	40,381	40,177		39,974	39,161		38,754
FLORIDA	742		750	759	763		767	783		791
FOXBOROUGH	14,637		15,081	15,524	15,746		15,968	16,856		17,299
FRAMINGHAM	64,989		65,791	66,592	66,993		67,394	68,997		69,799
FRANKLIN	22,095		22,764	23,433	23,768		24,103	25,442		26,112
FREETOWN	8,522		8,739	8,956	9,065		9,174	9,608		9,825
GARDNER	20,125		20,123	20,121	20,120		20,119	20,115		20,113
GAY HEAD	201	405	434 T	464	230	479	569	260		659
GEORGETOWN	6,384		6,523	6,662	6,732		6,802	7,082		7,222
GILL	1,583		1,592	1,602	1,606		1,611	1,629		1,639
GLOUCESTER	28,716		29,224	29,733	29,987		30,241	31,257		31,766
GOSHEN	830		921	1,013	1,058		1,104	1,287		1,378
GOSNOLD	98		84	71	64		57	30		16
GRAFTON	13,035		13,077	13,119	13,140		13,161	13,245		13,287
GRANBY	5,565		5,712	5,860	5,933		6,007	6,302		6,449
GRANVILLE	1,403		1,490	1,577	1,620		1,664	1,837		1,924
GREAT BARRINGTON	7,725		7,632	7,539	7,493		7,446	7,260		7,167
GREENFIELD	18,666		18,507	18,347	18,267		18,188	17,869		17,709
GROTON	7,511		7,894	8,278	8,469		8,661	9,428		9,811
GROVELAND	5,214		5,261	5,308	5,332		5,355	5,450		5,497
HADLEY	4,231		4,210	4,189	4,179		4,168	4,126		4,106
HALIFAX	6,526		6,678	6,831	6,907		6,983	7,288		7,441
HAMILTON	7,280		7,387	7,494	7,547		7,601	7,815		7,922
HAMPDEN	4,709		4,845	4,981	5,048		5,116	5,388		5,524
HANCOCK	628		622	616	612		609	597		591
HANOVER	11,912		11,896	11,879	11,871		11,863	11,831		11,814
HANSON	9,028		9,161	9,294	9,360		9,427	9,693		9,826
HARDWICK	2,385		2,475	2,565	2,610		2,655	2,835		2,925
HARVARD	12,329		12,674	13,018	13,190		13,363	14,052		14,396
HARWICH	10,275	16,035	16,502 T	16,969	11,316		17,436	12,357	18,369	18,836
HATFIELD	3,184		3,248	3,312	3,344		3,376	3,503		3,567
HAVERHILL	51,418		52,069	52,720	53,045		53,371	54,673		55,324

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
HAWLEY	317		349	380	396		412	476		507
HEATH	716		710	704	701		698	686		680
HINGHAM	19,821		19,671	19,521	19,446		19,371	19,071		18,921
HINSDALE	1,959		2,007	2,054	2,078		2,102	2,197		2,245
HOLBROOK	11,041		11,312	11,582	11,718		11,853	12,394		12,665
HOLDEN	14,628		14,630	14,631	14,632		14,633	14,636		14,638
HOLLAND	2,185		2,324	2,464	2,533		2,603	2,882		3,021
HOLLISTON	12,926		13,279	13,633	13,809		13,986	14,692		15,046
HOLYOKE	43,704		42,463	41,222	40,602		39,981	37,499		36,258
HOPEDALE	5,666		5,525	5,384	5,313		5,242	4,960		4,819
HOPKINTON	9,191		9,701	10,211	10,465		10,720	11,740		12,250
HUBBARDSTON	2,797		2,834	2,870	2,888		2,907	2,980		3,016
HUDSON	17,233		17,792	18,350	18,629		18,909	20,026		20,584
HULL	10,466		10,262	10,057	9,955		9,853	9,444		9,240
HUNTINGTON	1,987		2,031	2,075	2,098		2,120	2,208		2,252
IPSWICH	11,873		12,145	12,417	12,553		12,689	13,232		13,504
KINGSTON	9,045		9,155	9,265	9,320		9,375	9,595		9,705
LAKEVILLE	7,785		8,161	8,536	8,724		8,912	9,663		10,039
LANCASTER	6,661		6,652	6,643	6,638		6,634	6,615		6,606
LANESBOROUGH	3,032		3,156	3,280	3,342		3,404	3,652		3,776
LAWRENCE	70,207		67,802	65,397	64,195		62,992	58,183		55,778
LEE	5,849		5,876	5,903	5,917		5,931	5,985		6,012
LEICESTER	10,191		10,272	10,353	10,394		10,435	10,597		10,678
LENOX	5,069		5,096	5,123	5,136		5,149	5,203		5,230
LEOMINSTER	38,145		38,311	38,477	38,560		38,643	38,975		39,141
LEVERETT	1,785		1,826	1,867	1,887		1,908	1,989		2,030
LEXINGTON	28,974		29,135	29,296	29,376		29,457	29,779		29,940
LEYDEN	662		722	781	811		841	960		1,020
LINCOLN	7,666		7,882	8,098	8,206		8,314	8,746		8,962
LITTLETON	7,051		7,259	7,468	7,572		7,676	8,093		8,302
LONGMEADOW	15,467		15,545	15,623	15,662		15,701	15,857		15,935
LOWELL	103,439		102,389	101,339	100,814		100,289	98,189		97,139
LUDLOW	18,820		19,118	19,417	19,566		19,715	20,312		20,610
LUNENBURG	9,117		9,203	9,289	9,333		9,376	9,548		9,634
LYNN	81,245		80,018	78,791	78,178		77,565	75,111		73,884
LYNNFIELD	11,274		11,313	11,351	11,371		11,390	11,467		11,506
MALDEN	53,884		53,743	53,602	53,532		53,462	53,180		53,039
MANCHESTER	5,286		5,362	5,438	5,476		5,514	5,666		5,742
MANSFIELD	16,568		16,762	16,957	17,054		17,151	17,540		17,734
MARBLEHEAD	19,971		19,895	19,819	19,782		19,744	19,592		19,516
MARION	4,496		4,540	4,584	4,606		4,628	4,715		4,759
MARLBOROUGH	31,813		32,499	33,185	33,527		33,870	35,242		35,928
MARSHFIELD	21,531		21,899	22,267	22,451		22,635	23,371		23,739

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
MASHPEE	7,884	12,792	13,832 T	14,871	9,764		15,910	11,644	17,988	19,027
MATTAPOISETT	5,850		5,954	6,057	6,109		6,161	6,368		6,472
MAYNARD	10,325		10,544	10,763	10,873		10,983	11,421		11,640
MEDFIELD	10,531		10,846	11,160	11,317		11,475	12,104		12,418
MEDFORD	57,407		56,937	56,468	56,233		55,998	55,058		54,589
MEDWAY	9,931		10,267	10,602	10,770		10,938	11,609		11,945
MELROSE	28,150		28,096	28,041	28,014		27,987	27,878		27,824
MENDON	4,010		4,130	4,250	4,310		4,370	4,610		4,730
MERRIMAC	5,166		5,300	5,435	5,502		5,569	5,838		5,972
METHUEN	39,990		40,695	41,400	41,752		42,105	43,515		44,220
MIDDLEBOROUGH	17,867		18,049	18,232	18,323		18,414	18,779		18,961
MIDDLEFIELD	392		453	514	544		575	697		757
MIDDLETON	4,921		5,182	5,442	5,572		5,703	6,224		6,484
MILFORD	25,355		25,402	25,448	25,472		25,495	25,588		25,635
MILLBURY	12,228		12,201	12,174	12,160		12,147	12,092		12,065
MILLIS	7,613		7,838	8,064	8,176		8,289	8,739		8,965
MILLVILLE	2,236		2,341	2,447	2,499		2,552	2,763		2,868
MILTON	25,725		25,886	26,046	26,126		26,207	26,528		26,688
MONROE	115		112	109	108		107	101		98
MONSON	7,776		7,946	8,117	8,202		8,287	8,628		8,798
MONTAGUE	8,316		8,310	8,304	8,300		8,297	8,285		8,279
MONTEREY	805		937	1,068	1,134		1,200	1,463		1,594
MONTGOMERY	759		787	814	828		842	897		925
MOUNT WASHINGTON	135		131	128	126		124	117		113
NAHANT	3,828		3,865	3,902	3,921		3,939	4,013		4,051
NANTUCKET	6,012	15,184	15,572 T	15,960	7,156	16,154	17,319	8,300		18,483
NATICK	30,510		30,881	31,252	31,438		31,623	32,365		32,737
NEEDHAM	27,557		27,849	28,142	28,288		28,434	29,019		29,311
NEW ASHFORD	192		186	180	177		173	161		155
NEW BEDFORD	99,922		98,463	97,004	96,274		95,545	92,627		91,167
NEW BRAINTREE	881		878	875	874		873	867		864
NEW MARLBOROUGH	1,240		1,347	1,455	1,508		1,562	1,777		1,884
NEW SALEM	802		891	980	1,024		1,068	1,246		1,335
NEWBURY	5,623		5,871	6,120	6,244		6,368	6,865		7,113
NEWBURYPORT	16,317		16,664	17,011	17,185		17,359	18,053		18,400
NEWTON	82,585		82,919	83,254	83,421		83,588	84,257		84,591
NORFOLK	9,270		9,724	10,178	10,406		10,633	11,541		11,995
NORTH ADAMS	16,797		16,608	16,419	16,325		16,230	15,852		15,664
NORTH ANDOVER	22,792		23,327	23,862	24,129		24,397	25,467		26,002
NORTH ATTLEBOROUGH	25,038		25,076	25,113	25,132		25,151	25,226		25,263
NORTH BROOKFIELD	4,708		4,732	4,755	4,767		4,779	4,827		4,850
NORTH READING	12,002		12,348	12,694	12,867		13,039	13,731		14,077
NORTHAMPTON	29,289		29,173	29,056	28,998		28,940	28,708		28,591

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
NORTHBOROUGH	11,929		12,061	12,193	12,260		12,326	12,590		12,722
NORTHBRIDGE	13,371		13,363	13,355	13,351		13,348	13,332		13,324
NORTHFIELD	2,838		2,838	2,838	2,838		2,838	2,839		2,839
NORTON	14,265		14,446	14,627	14,717		14,807	15,169		15,350
NORWELL	9,279		9,273	9,268	9,265		9,262	9,251		9,246
NORWOOD	28,700		28,957	29,215	29,344		29,472	29,987		30,244
OAK BLUFFS	2,804	9,200	9,017 T	8,834	2,825	8,743	8,194	2,846		7,646
OAKHAM	1,503		1,573	1,643	1,679		1,714	1,854		1,924
ORANGE	7,312		7,540	7,767	7,881		7,995	8,450		8,677
ORLEANS	5,838	8,814	9,207 T	9,601	6,853		9,994	7,868	10,781	11,174
OTIS	1,073		1,144	1,216	1,251		1,287	1,429		1,501
OXFORD	12,588		12,852	13,117	13,249		13,381	13,910		14,174
PALMER	12,054		12,289	12,524	12,641		12,758	13,228		13,463
PAXTON	4,047		4,126	4,204	4,243		4,283	4,440		4,519
PEABODY	47,039		47,282	47,525	47,646		47,768	48,253		48,496
PELHAM	1,373		1,482	1,592	1,647		1,701	1,920		2,030
PEMBROKE	14,544		14,817	15,090	15,227		15,363	15,909		16,182
PEPPERELL	10,098		10,765	11,432	11,765		12,098	13,432		14,099
PERU	779		858	937	976		1,016	1,174		1,253
PETERSHAM	1,131		1,140	1,149	1,153		1,157	1,175		1,184
PHILLIPSTON	1,485		1,471	1,458	1,451		1,444	1,417		1,403
PITTSFIELD	48,622		47,851	47,079	46,694		46,308	44,765		43,994
PLAINFIELD	571		601	632	647		662	723		754
PLAINVILLE	6,871		6,987	7,102	7,160		7,218	7,449		7,565
PLYMOUTH	45,608		45,617	45,626	45,630		45,634	45,652		45,661
PLYMPTON	2,384		2,441	2,498	2,526		2,554	2,668		2,725
PRINCETON	3,189		3,302	3,416	3,472		3,529	3,756		3,869
PROVINCETOWN	3,561	7,736	7,785 T	7,833	3,615		7,882	3,669	7,979	8,027
QUINCY	84,985		85,755	86,525	86,910		87,295	88,835		89,604
RANDOLPH	30,093		30,616	31,140	31,401		31,663	32,709		33,233
RAYNHAM	9,867		9,999	10,132	10,198		10,264	10,529		10,661
READING	22,539		22,782	23,026	23,147		23,269	23,755		23,999
REHOBOTH	8,656		9,006	9,356	9,532		9,707	10,407		10,757
REVERE	42,786		43,321	43,856	44,124		44,391	45,462		45,997
RICHMOND	1,677		1,693	1,710	1,718		1,726	1,759		1,776
ROCHESTER	3,921		4,171	4,422	4,547		4,672	5,173		5,424
ROCKLAND	16,123		15,928	15,733	15,635		15,537	15,147		14,952
ROCKPORT	7,482		7,519	7,555	7,573		7,592	7,665		7,701
ROWE	378		411	445	461		478	545		578
ROWLEY	4,452		4,592	4,732	4,802		4,872	5,152		5,291
ROYALSTON	1,147		1,207	1,267	1,297		1,327	1,447		1,506
RUSSELL	1,594		1,660	1,726	1,760		1,793	1,925		1,991
RUTLAND	4,936		5,032	5,129	5,177		5,225	5,417		5,514

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
SALEM	38,091		38,331	38,571	38,691		38,811	39,290		39,530
SALISBURY	6,882		7,572	8,261	8,606		8,951	10,330		11,020
SANDISFIELD	667		786	906	966		1,025	1,264		1,384
SANDWICH	15,489	19,245	20,462 T	21,679	18,206		22,895	20,924	25,328	26,545
SAUGUS	25,549		25,690	25,831	25,901		25,972	26,254		26,395
SAVOY	634		705	777	813		848	991		1,063
SCITUATE	16,786		16,728	16,671	16,642		16,613	16,498		16,441
SEEKONK	13,046		13,149	13,253	13,304		13,356	13,563		13,666
SHARON	15,517		16,061	16,604	16,876		17,148	18,235		18,779
SHEFFIELD	2,910		2,938	2,966	2,979		2,993	3,049		3,077
SHELBURNE	2,012		2,068	2,123	2,151		2,179	2,290		2,346
SHERBORN	3,989		4,148	4,307	4,386		4,465	4,783		4,942
SHIRLEY	6,118		6,348	6,578	6,693		6,808	7,267		7,497
SHREWSBURY	24,146		24,103	24,060	24,038		24,017	23,931		23,888
SHUTESBURY	1,561		1,606	1,650	1,673		1,695	1,785		1,829
SOMERSET	17,655		17,597	17,540	17,511		17,482	17,367		17,309
SOMERVILLE	76,210		73,941	71,671	70,536		69,402	64,863		62,594
SOUTH HADLEY	16,685		16,810	16,935	16,997		17,060	17,310		17,435
SOUTHAMPTON	4,478		4,705	4,932	5,045		5,159	5,612		5,839
SOUTHBOROUGH	6,628		6,659	6,690	6,706		6,721	6,783		6,814
SOUTHBRIDGE	17,816		17,499	17,181	17,022		16,864	16,229		15,912
SOUTHWICK	7,667		7,964	8,261	8,410		8,558	9,152		9,449
SPENCER	11,645		11,961	12,276	12,434		12,592	13,223		13,538
SPRINGFIELD	156,983		154,162	151,341	149,931		148,520	142,879		140,058
STERLING	6,481		6,863	7,244	7,435		7,626	8,389		8,770
STOCKBRIDGE	2,408		2,397	2,387	2,381		2,376	2,354		2,344
STONEHAM	22,203		22,605	23,007	23,208		23,409	24,213		24,615
STOUGHTON	26,777		27,566	28,355	28,749		29,144	30,722		31,511
STOW	5,328		5,568	5,808	5,929		6,049	6,529		6,769
STURBRIDGE	7,775		8,090	8,405	8,563		8,720	9,350		9,665
SUDBURY	14,358		14,674	14,989	15,147		15,305	15,936		16,251
SUNDERLAND	3,399		3,396	3,393	3,392		3,390	3,384		3,382
SUTTON	6,824		7,104	7,383	7,523		7,663	8,222		8,501
SWAMPSCOTT	13,650		13,527	13,404	13,343		13,281	13,035		12,912
SWANSEA	15,411		15,575	15,738	15,820		15,902	16,229		16,393
TAUNTON	49,832		49,520	49,207	49,051		48,895	48,270		47,958
TEMPLETON	6,438		6,550	6,661	6,717		6,773	6,996		7,108
TEWKSBURY	27,266		27,820	28,374	28,651		28,928	30,036		30,590
TISBURY	3,120	7,180	7,852 T	8,124	3,749	8,360	9,776	4,379		11,191
TOLLAND	289		304	319	326		334	364		378
TOPSFIELD	5,754		5,767	5,781	5,787		5,794	5,821		5,834
TOWNSEND	8,496		9,210	9,925	10,282		10,639	12,068		12,783
TRURO	1,573	5,498	5,611 T	5,724	1,622		5,837	1,670	6,062	6,175

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
TYNGSBOROUGH	8,642		9,203	9,763	10,044		10,324	11,445		12,006
TYRINGHAM	369		392	414	426		437	482		505
UPTON	4,677		4,788	4,900	4,956		5,011	5,234		5,346
UXBRIDGE	10,415		10,440	10,466	10,478		10,491	10,541		10,567
WAKEFIELD	24,825		25,191	25,557	25,740		25,923	26,655		27,021
WALES	1,566		1,699	1,833	1,899		1,966	2,233		2,366
WALPOLE	20,212		20,909	21,605	21,954		22,302	23,696		24,392
WALTHAM	57,878		58,128	58,378	58,503		58,627	59,127		59,377
WARE	9,808		9,988	10,167	10,257		10,347	10,707		10,886
WAREHAM	19,232		19,991	20,750	21,129		21,508	23,026		23,785
WARREN	4,437		4,493	4,549	4,577		4,605	4,717		4,773
WARWICK	740		730	720	715		710	690		680
WASHINGTON	615		636	657	668		678	721		742
WATERTOWN	33,284		33,041	32,798	32,676		32,555	32,069		31,825
WAYLAND	11,874		12,146	12,418	12,554		12,690	13,234		13,505
WEBSTER	16,196		16,189	16,181	16,178		16,174	16,159		16,152
WELLESLEY	26,615		26,824	27,033	27,137		27,242	27,661		27,870
WELLFLEET	2,493	6,413	6,636 T	6,860	2,885		7,083	3,277	7,530	7,754
WENDELL	899		956	1,013	1,041		1,070	1,185		1,242
WENHAM	4,212		4,240	4,268	4,282		4,296	4,352		4,381
WEST BOYLSTON	6,611		6,574	6,537	6,519		6,501	6,428		6,392
WEST BRIDGEWATER	6,389		6,444	6,498	6,526		6,553	6,662		6,717
WEST BROOKFIELD	3,532		3,692	3,851	3,931		4,011	4,330		4,489
WEST NEWBURY	3,421		3,562	3,703	3,774		3,845	4,127		4,269
WEST SPRINGFIELD	27,537		27,432	27,327	27,275		27,223	27,013		26,908
WEST STOCKBRIDGE	1,483		1,484	1,484	1,484		1,485	1,486		1,486
WEST TISBURY	1,704	3,381	3,163 T	2,945	1,724	2,836	2,182	1,745		1,527
WESTBOROUGH	14,133		14,074	14,015	13,986		13,957	13,840		13,781
WESTFIELD	38,372		38,685	38,998	39,154		39,310	39,936		40,249
WESTFORD	16,392		17,014	17,637	17,948		18,259	19,505		20,128
WESTHAMPTON	1,327		1,384	1,441	1,469		1,498	1,613		1,670
WESTMINSTER	6,191		6,325	6,459	6,526		6,593	6,862		6,996
WESTON	10,200		10,378	10,557	10,646		10,735	11,092		11,271
WESTPORT	13,852		14,103	14,354	14,479		14,605	15,107		15,359
WESTWOOD	12,557		12,699	12,842	12,913		12,984	13,270		13,413
WEYMOUTH	54,063		55,258	56,453	57,051		57,649	60,041		61,237
WHATELY	1,375		1,429	1,482	1,509		1,536	1,643		1,697
WHITMAN	13,240		13,147	13,054	13,008		12,962	12,777		12,684
WILBRAHAM	12,635		12,796	12,957	13,038		13,119	13,442		13,604
WILLIAMSBURG	2,515		2,626	2,737	2,792		2,848	3,070		3,181
WILLIAMSTOWN	8,220		8,108	7,995	7,939		7,883	7,659		7,547
WILMINGTON	17,651		18,007	18,364	18,542		18,720	19,433		19,789
WINCHENDON	8,805		9,018	9,231	9,338		9,445	9,871		10,084

APPENDIX L: Massachusetts Population Projections

CITY/TOWN	MISER 1990 POP	DEP WINT/SUM CALC 1990	DEP ESTIMATED 1992 POP	DEP ESTIMATED 1994 POP	MISER 1995 POP	DEP WINT/SUM CALC 1995	DEP ESTIMATED POP 1996	MISER 2000 POP	DEP WINT/SUM CALC 2000	DEP ESTIMATED 2002 POP
WINCHESTER	20,267		20,204	20,141	20,109		20,078	19,952		19,889
WINDSOR	770		789	808	818		828	868		888
WINTHROP	18,127		18,233	18,338	18,391		18,444	18,657		18,763
WOBURN	35,943		36,874	37,805	38,271		38,736	40,598		41,529
WORCESTER	169,759		167,559	165,358	164,258		163,158	158,758		156,559
WORTHINGTON	1,156		1,331	1,506	1,593		1,681	2,032		2,207
WRENTHAM	9,006		9,432	9,858	10,071		10,284	11,136		11,561
YARMOUTH	21,174	31,263	31,673 T	32,083	22,265		32,493	23,356	33,313	33,723
	6,016,425	329,568	6,187,853	6,233,870	6,127,523	49,742	6,282,436	6,238,717	330,293	6,420,591

NOTES:

1) Tourism numbers for Marthas Vineyard, Nantucket and Cape communities are included and were reported by the Cape Cod Planning Commission for 1990, 1995 & 2000
2) (T) Communities where tourism has been calculated and included in population number.
3) Marthas Vineyard & Nantucket tourism numbers calculated between FIVE YEAR difference, 1990 to 1995.
4) Cape tourism numbers calculated between TEN YEAR difference, 1990 to 2000.
5) MISER = Massachusetts Institute for Social and Economic Research.

APPENDIX M

MASSACHUSETTS SOLID WASTE USER FEE PROGRAMS: The following is a listing of Massachusetts solid waste user fee programs originally compiled in September of 1993. Information has been collected from a variety of sources, including the Massachusetts Municipal Association, recycling equipment grant applications, published newspaper accounts, a John F. Kennedy School of Government survey and anecdotal evidence. Current data are continuing to be collected and verified.

Volume based User Fees
(55 communities)

Town	Curbside/Drop-off	Unit Price
Amherst	Curbside	$105 /yr 1 barrel
		$140 /yr 2 barrel
Ashburnham	Curbside	$1.00 /15 ga. bag
		$1.50 /30 ga. bag
Ashfield	Drop-off	$1 /30 ga. bag
Athol	Curbside	$1 /bag
Belchertown	Drop-off	$30 /yr + $0.80 /bag
Boxford	Curbside	$0.70 /30 ga. bag
Brimfield	Curbside	$1 /bag
Charlemont	Drop-off	$1 /30 ga. bag
Chesterfield	Drop-off	$0.75 /15 ga. bag
		$1.50 /30 ga. bag
Chilmark	Drop-off	$2.65 /40 ga. bag/barrel
Clinton	Curbside	$0.75 /bag
Colrain	Drop-off	$1.00 /33 ga. bag
		$0.50 /16 ga. bag
Concord	Curbside	$0.90 /16 ga. bag
		$1.75 /44 ga. bag
Danvers	Drop-off	$10 /12 Transfer Station trips
Edgartown	Drop-off	$2.25 /40 ga. bag/barrel
Freetown	Curbside	$1.50 /bag
Gayhead	Drop-off	$2.65 /40 ga. bag/barrel
Gill	Curbside	$1 /bag
Gloucester	Curbside	$1 /bag
Goshen	Drop-off	$10 /yr + $2 /30 ga. bag
Halifax	Curbside	$1 /bag
Hardwick	Drop-off	$1 /bag
Hatfield	Drop-off	$25 /yr + $2 /bag
Hawley	Drop-off	$1 /30 ga. bag/barrel
Hudson	Drop-off	$10 /yr + $3 /carload
Huntington	Drop-off	$0.60 /16 ga. bag
Manchester	Curbside	$0.50 /32 ga. bag or barrel
Mendon	Curbside	$1.25 /bag
Millis	Drop-off	$50/yr + $1 /bag
		$1.00 /30 ga. bag

(Volume based User Fees Continued)

Town	Curbside/Drop-off	Unit Price
Milton	Curbside	One free can/wk; then $1.50 /can
Montague	Curbside	$1 /bag
North Adams	Drop-off	$50 /yr + $1.75 /30 ga. or $0.90 for 15 gals.
Norfolk	Drop-off	$1.35 /30 ga. bag
North Reading	Curbside	$0.65 /bag
Northampton	Drop-off	$1 /bag
Orange	Drop-off	$10 /yr + $1 /bag
Palmer	Drop-off	$1.00 /30 ga. bag
Petersham	Drop-off	$10 /yr + $1 /bag
Plainfield	Drop-off	$25 /punchcard (good for 50 bags
Russell	Drop-off	$20 /yr + $1 /30 ga. $0.60 /15 ga.
Salisbury	Drop-off	$0.80 /bag
Seekonk	Curbside	$86/year base + $0.31 /14-20 ga. bag or $0.53 /31-33 ga. bag
Shelburne	Drop-off	$1 /bag
Southbridge	Drop-off	$2 /trip to Transfer Station
Tisbury	Drop-off	$2.25 /40 ga. bag or barrel
Ware	Drop-off	$40 /yr + $1 /bag
Warwick	Drop-off	$1 /bag
Webster	Drop-off	$1 /bag if recycle $2 /bag without
Wendell	Drop-off	$0.50 /bag
Westhampton	Drop-off	$25 /yr + $1 /bag
West Tisbury	Drop-off	$2.65 /40 ga. bag or barrel
Wilbraham	Drop-off	$60 /yr + $0.60 /bag
Williamstown	Drop-off	$0.75 /15 ga. bag $1.50 /30 ga. bag
Worcester	Curbside	$0.50 /bag (to start 11/15/93)
Worthington	Drop-off	$30 /yr + $0.50 /bag

Flat Rate User Fees – Curbside Service
(14 communities)

Town	Price
Acushnet	$ 65/yr
Attleboro	$ 83/yr
Brockton	$140/yr
Brookline	$150/yr
Chelsea	$152.50/yr
East Brookfield	$104/yr
Franklin	$160/yr
Hinsdale	$ 30/yr
Holliston	$ 75/yr
Marshfield	$ 70/yr
Medway	$150/yr
Nahant	$ 75/yr + $ 35/person/yr
Pembroke	$120/yr
Reading	$110/yr

Flat Rate User Fees -- Landfill/Transfer Station Drop-off
(84 communities)

Town	Price
Acton	$85/yr
Adams	$12/yr
Alford	$30/yr
Ashby	$50/yr
Ashburnham	$40/yr
Ashfield	$35/yr
Barnstable	$45/yr
Barre	$ 3/yr
Becket	$40/yr
Berlin	$50/yr
Bernardston	$25/yr
Bolton	$75/yr
Bourne	$ 7/yr
Boylston	$ 5/yr
Braintree	$10/yr
Brookfield	$50/yr
Buckland	$25/yr
Carlisle	$10/yr
Chatham	$35/yr
Charlton	$10/yr
Cohasset	$52/yr
Cummington	$100/yr
Deerfield	$35/yr
Dennis	$50/yr
Douglas	$10/yr
Dudley	$ 2/yr
Duxbury	$60/yr
Eastham	$45/yr
Egremont	$120/yr
Fairhaven	$ 5/car/yr + charge based on vehicle tonnage
Foxborough	$100/yr
Groton	$30/yr
Hadley	$30/yr
Hanson	$100/yr
Harvard	$50/yr

(Flat Rate User Fees
Landfill/Transfer Station Drop-off Continued)

Town	Price
Heath	$25/yr
Holland	$25/yr
Hull	$50/yr
Lakeville	$50/yr ($100/yr business)
Leverett	$35/yr
Littleton	$100/yr
Ludlow	$30/yr ($60/yr business)
Lunenberg	$40/yr
Marlborough	$5/yr
Mashpee	$30/yr
Merrimac	$30 /yr
Middleborough	$ 5/yr
Middlefield	$45 /1 year dump sticker
Middleton	$10/yr
Millbury	$15/yr
Mount Washington	$50/yr
Nantucket	$50/yr
Newbury	$ 5/yr
North Brookfield	$50/yr
Northfield	$25/yr
Orleans	$75/yr
Otis	$20/yr
Palmer	$35/yr ($50/yr business)
Pepperell	$50/yr
Plymouth	$20/yr
Rockport	$75/yr
Sandwich	$35/yr
Scituate	$10/yr
Sheffield	$110/yr
South Hadley	$ 5/yr
Southboro	$100/yr
Southwick	$40/yr
Sudbury	$65/yr
Sutton	$ 5/yr
Templeton	$ 5/yr

(Flat Rate User Fees
Landfill/Transfer Station Drop-off Continued)

Town	Price
Upton	$25/yr
Wales	$20/yr
Warren	$ 2/yr
Wellfleet	$45/yr or $3/carload
West Bridgewater	$10/yr
West Brookfield	$25/yr
Westborough	$10/yr
Weston	$130/yr
Wilbraham	$65/yr
Williamsburg	$40/yr
Williamstown	$17/yr
Winchendon	$50/yr
Windsor	$15/yr
Yarmouth	$70/yr

No municipal service -- Private subscription
Flat Rate User Fees
Curbside Service
(16 communities)

Town	Price
Auburn	$13/month
Granby	$15/month
Hadley	$18-19/month
Holden	$18-22/month
Hubbardston	$20/month
Hull	$18/month
Leicester	$20/month
New Braintree	$27/month
Northbridge	$20/month
Oxford	$16-18/month
Princeton	$19/month
Rowley	$12/month
Rutland	$18/month
Sharon	$11/month
Sturbridge	$25/month
Uxbridge	$19-24/month